The Magazine of the Registered Professional Engineer

American Engineer

MAY 1960

THE SOUTHWEST—
ENGINEERS NEW
LAND OF PROMISE
See Page 21

Plus:

- An Engineering Career in Defense—Good or Bad?
- The Sanitary Engineer—Most Professional?
- Highway Lighting

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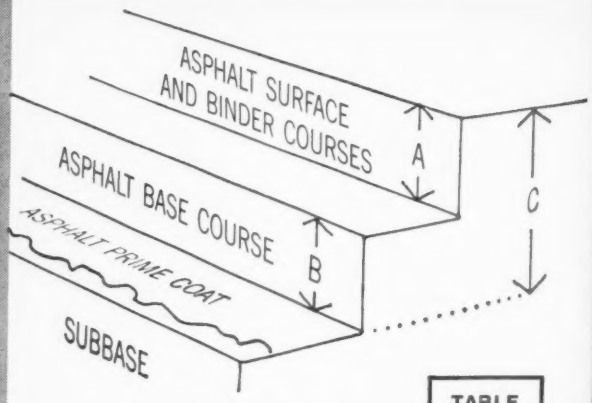


PAVEMENT DETAIL

TABLE 1

Recommended Minimum Thicknesses of Surface-Plus-Binder and of Base Courses (inches)*

TRAFFIC	A**	B w/ Asph base	B w/o Asph base	C w/ Asph base	C w/o Asph base
Very Hvy	4	4	6	8	10
Heavy	3	3½	5	6½	8
Medium	3	2	3	5	6
Light	2	2	3	4	5

**For thickness of subbase and improved subgrade courses, see Asphalt Institute Manual Series No. 1.*

***May be reduced by substitution of Asphalt base of comparable strength on inch-for-inch basis.*

"THE INCREASING STRESSES now being imposed on pavements by modern heavy traffic with average tire contact pressures as high as 100 psi or more, and the anticipated future increase in wheel coverages indicate that general improvements in design and construction must be made. To meet this need, The Asphalt Institute calls to the attention of highway designers the Advanced Design Criteria given in broad detail above and designated, 'Deep-Strength' Asphalt pavements. The Institute strongly recommends the adoption of these Advanced Design Criteria in the construction of all future heavy-duty Asphalt pavements. For detailed data, you are urged to contact The Asphalt Institute District Engineer in your area."

Owen S. Wellborn

CHIEF ENGINEER

DESIGN CRITERIA for "DEEP-STRENGTH" ASPHALT PAVEMENTS

RECOMMENDED MINIMUM COMPACTION CRITERIA* (summary)

TABLE 2

Non-Asphalt Courses

COURSE	MINIMUM (% modified AASHO Density)
Subgrades (layers not to exceed 6 inches)	
Cohesive	95%; top 12 inches 90%; balance of fill (When optimum moisture is near plastic limit, compact at moisture content approximately 1% below theoretical optimum).
Cohesionless	100%; top 12 inches 95%; balance of fill
BASES, SUBBASES AND IMPROVED SUBGRADES (Layers not to exceed 6 inches)	
All (*proof roll with heavy rubber-tire rollers*).	Compaction load and contact pressures as high as material will support without undue rutting or displacement.

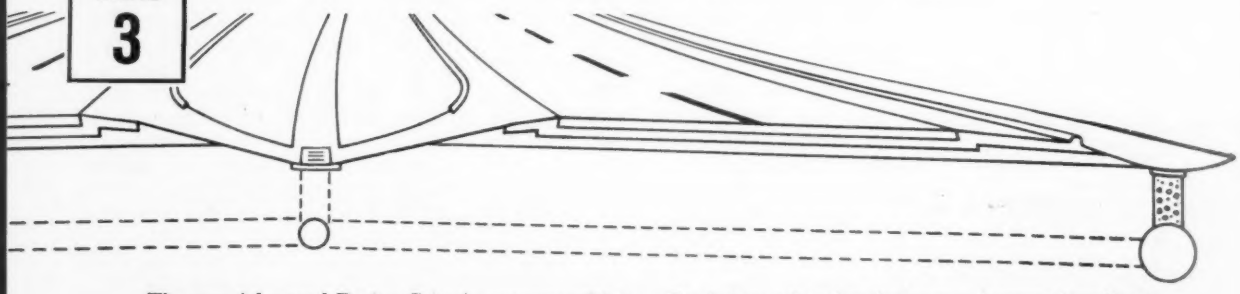
ASPHALT COURSES (base, binder, surface)

COURSE	MINIMUM CRITERIA
SUPPORTING COURSES	Flat steel-wheel rollers to be supplemented with pneumatic tire rollers having average tire contact pressures of 85-110 psi
SURFACE COURSES	Same as for Supporting Courses.

**For detailed information see The Asphalt Handbook, Manual Series No. 4.*

TABLE 3

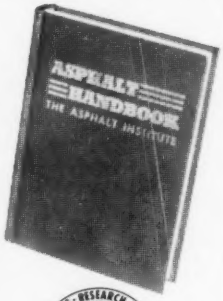
FULL-WIDTH DRAINAGE (Typical Cut Section)



The new Advanced Design Criteria recommend better surface and subsurface drainage. For better *surface* drainage full-width paving is recommended. On elevated grades the water should be directed to Asphalt spillways by means of Asphalt dykes or curbs constructed on the extreme outside edge of the shoulder.

For better *subsurface* drainage a depressed median is recommended wherever possible. If conditions make it mandatory to construct an elevated median, transverse drains should be connected with a longitudinal drain in the median deep enough to collect all ground water before it can find its way into the pavement structure.

NEW HANDBOOK! Now on the presses is a new edition of *The Asphalt Handbook*. It incorporates all the Advanced Design Criteria for highways implied by the term **Deep-Strength** Asphalt Construction. It also includes the latest design and research data concerning other major uses of Asphalt . . . for ditch linings, embankment facings, etc. Copies will soon be available at The Asphalt Institute office serving your area.



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Letters to the Editor

High on AE! . . .

Dear Editor:

The AMERICAN ENGINEER recently has been carrying articles of intense interest to all engineers. They are well written, pertinent, and cumulatively powerful.

You should be commended for the high standards established and encouraged to maintain them.

D. M. MCCAIN, Head,
Department of Civil Engineering,
Mississippi State U.,
State College, Miss.

Answer to Mr. Fleming . . .

Dear Editor:

I read with interest Mr. Fleming's letter which appeared on page 4 of your March issue.

I have reread Admiral Rickover's comments presented in the January, February, and March, 1960, issues of the AMERICAN ENGINEER. The quotation cited by Mr. Fleming is correct, but it is also interesting to note the Admiral's comments regarding avoiding placement of a "layman" in charge of professionals. This leads me to believe that Admiral Rickover does not consider the management to do its best job with professionals unless management is professional in its background and practice.

It may be that Mr. Fleming has inadvertently assumed that we have necessarily degenerated from professional to lay management. The quotation from Admiral Rickover did not state that all professional engineers should lose their professional status upon becoming a member of the management team. Conversely, I am sure that Mr. Fleming would agree that a professional engineer who is not a manager must have regard for management problems or he cannot be considered professional.

The suggestion that our remarks are "platitudes of the type found in books on management" was appreciated. Many companies have found a way to apply these platitudes to their employment practices.

Mr. Fleming may have meant to question whether the facts concerning smaller and larger companies were correctly recorded in the articles. Many of these facts reflect many years of experience in the subject companies, a few of which were spent as technician, pre-professional, and project engineer.

I believe we have been qualified, ethically, to write about our observations.

WAYNE E. AULT, P. E.
Youngstown, Ohio

On Unions . . .

Dear Editor:

I read with great interest the article (AE March) of how the NSPE is urging a more vigorous stand against unionization. I feel that the question of what takes the place of the union continues to go unanswered. The medical profession, through the American Medical Association, represents the doctor and sets fees and standards of performance and most vigorously. The legal profession is represented very competently by the Bar Association. It should be pointed out that the majority of the members of the legal and medical profession are self-employed or virtually self-sufficient. This is not the case in our profession.

Most of the members, being employed, do not have the voice or freedom to set standards of salaries or working conditions that do not coincide with those of the employer. In fact, if there is an engineer in management, he must act first as a management representative and then as a professional man. Human nature being what it is and engineering manpower being a mere commodity as is labor and raw material, who as an individual can as successfully negotiate for his wage and benefits advancement? Workmen have been exploited and they organized. The other professions organized behind something more forceful than "professional pride" and initiative.

I would now state that if the engineering profession is to be universally accepted as a profession, there must be a forceful organization to set work standards and arrange for adequate compensation by bargaining with management. With engineers being credited with the great technological advances now current, it is now mandatory that the profession be established as such. It is not enough to write and speak such flowery sentiments as "the individual responsibility (?) and independent (?) judgment of a professional engineer are incompatible with the regimentation fundamentally inherent in unionization" (But does this rule out all organizations?) *Question marks are those of the writer.*

JOHN R. DAVIS, P. E.
Springfield, Pa.

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Meetings of Note

Long Island Conference on Utilization of Engineers and Scientists—Special Meeting, May 10-11, Garden City Hotel, Garden City, New York.

American Institute of Industrial Engineers—Annual Meeting, May 12-14, Dallas-Sheraton Hotel, Dallas, Texas.

American Water Works Association—Annual Convention, May 15-20, Bal Harbour, Miami Beach, Florida.

Society of American Military Engineers—National Convention, May 19, Mayflower Hotel, Washington, D.C.

National Telemetering Conference—Annual Meeting, May 23-25, Miramar Hotel, Santa Monica, California.

American Society of Mechanical Engineers—Design Engineering Conference and Show, May 23-26, Statler-Hilton Hotel, New York, New York.

American Engineer

MAY 1960
Vol. 31, No. 5

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS
FOUNDED 1934

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The American Engineer is published monthly by the National Society of Professional Engineers, 2029 K St., N.W., Washington 6, D. C., and printed by the National Publishing Company, Washington, D. C. Second Class Postage Paid at Washington, D. C.

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Subscription Rates: $3 per year in advance to members of NSPE and its Affiliated Societies; $4 per year in advance to non-members in U. S. A. and its possessions, Canada and Mexico. Foreign, $5 per year. Single copy, 50¢.

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Automation Gives Engineers New Role, Says Firm Pres.

Increasing automation in our everyday living has resulted in engineering taking on a third dimension, J. N. Bauman, president of The White Motor Company, Cleveland, told more than 500 automotive engineers recently at the annual National Automobile Week luncheon of the Society of Automotive Engineers.

This third dimension involves increasing knowledge of and assistance to the consumer to enable him to get full value from our modern machines, he said. He pointed out that engineers are taking a broader aspect of product design and application in relation to user needs and habits, combining the scientific and mathematical with the practical to the mutual benefit of the producer and user.

"Engineers today are assuming increasingly important roles in policy-making and planning in more and more companies," the White Motor executive said. One of the reasons is that the engineering profession has changed from strictly technical development to a much broader scope that includes evaluation and understanding of human interests, comforts and desires.

An engineering background, he pointed out, is ideal for building to the responsibilities of management. And since engineers are entitled to a great deal of credit for advancements taking place in our way of life, it's logical that they should have vital roles in future planning and progress.

In assuming such responsibility, today's engineer is broadening his breadth of knowledge, Mr. Bauman pointed out, to obtain greater understanding of human nature as it relates to desire for products and to use of those products.

Design Engineering Show Scheduled for May 23

American manufacturers will get a glimpse of the products of the future when the Design Engineering Show, largest exposition devoted to research and development, unveils a $10,000,000 exhibit on May 23. The show will run for four days at the Coliseum in New York where it has been held only once before.

Everything that goes into the ultimate product used in the home or factory will be on display.

Twenty thousand engineers and company executives, whose responsibility is to design the products of tomorrow, are expected to attend, according to Saul Poliak, president, Clapp & Poliak, Inc., producer of the show. Virtually every major manufacturing company in the country will be represented among the visitors. About 15,000 products, which go into the making of end products, will be shown.

One-Day Conference Set on Technical Communications

Leaders in industry, education and the press will attack the growing crisis in technical communications at a conference entitled "The Critical Million—How to Talk to the Nation's Scientists and Engineers . . . Industry's Most Vital Audience," sponsored by New York University, May 17, in New York City.

Executives attending the one-day seminar will hear from authorities in technical public relations and participate in a question and answer discussion with leading newspaper and magazine editors. The goal of the meeting will be to seek ways to improve technical progress through better communications.

World's Engineers to Convene in Scotland

The Royal College of Science and Technology, Glasgow, Scotland, will be the scene of a worldwide gathering of scientists and engineers, May 17-20. The college is holding a symposium on nuclear reactor containment buildings and pressure vessels.

British and American experts will read twenty-three papers, subjects ranging from commentary on current practice in design and construction, to the theoretical consideration of loads on domes or the result of attachments to shells.

On the American side, L. P. Zick of the Chicago Bridge and Iron Company, which is associated with two great engineering firms in the Glasgow area, will present a paper on the design of steel containment vessels in the United States.

Cornell University will be represented by W. McGuire and G. P. Fisher (Civil Engineering School) and P. P. Bijlaard, L. T. Cranch and W. Dally (Engineering Mechanics and Materials Department).

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"This Month"

More and more engineers are finding jobs (and good ones) in the Southwest. In "The Southwest—Engineers New Land of Promise," page 21, the AE takes a look at some of the new industrialization and the growing need for engineering talent in that booming area of America.

It is difficult to choose which of the branches of engineering has made the most notable gains toward professionalism in the past decade, but the authors of the article "The Sanitary Engineer—Most Professional?" make a good case for those in the important sanitation field. Page 27.

Defense is a big business in the U. S. and affects the jobs of thousands of engineers. Rapidly changing weapon requirements produce big opportunities and at the same time big problems in the employment of engineering personnel in these industries. Some of the problems faced by defense contractors and their engineers are explored in the staff report beginning on page 34.

And four shorter pieces not to be missed: Page 30—U. S. Army Signal Corps Converts Engineering Drawings to Microfilm. Page 39—Case #59-2 is reported by the Board of Ethical Review. Page 40—First of a series of Unique Experiences in Engineering, "Sliderule Man in Mystic India." Page 42—An AE "Engineer at Work" piece on highway lighting.

A Glance at the News "This Month:"

General: Story #1: A leading executive discusses automation and engineers. #2: Registration on the increase in the Air Force. #3: Survey shows high-paid executives less in demand. Begins on page 6.

Consulting: Page 10. The headlines: Committee Questions Design Costs, Number of Engineers; NSPE Urges Congress to Raise Per Diem Maximums; Highway Consultants Used As Scapegoats—Rep. Scherer.

Education: The important story here (page 14) is a discussion by leading scientist Dr. Alexander H. Flax of the relative recognition now given the engineer and the scientist. Another important story shows that engineering enrollment has dropped again.

Government: It is good news for government engineers with the Civil Service Commission upping starting pay for engineers. In some related news, NSPE says a pay increase alone is not the whole story and puts forward five principles for legislation involving Federal salaries for engineers. Page 16.

Industry: The first NSPE Industrial Professional Development Award has gone to the Phillips Petroleum Company. Full story on page 18. In three other stories: Professionals, Technicians Split in Ladish Union Vote; Sperry Union Seeks Affiliation with IUE, and NSPE Urges Amendment of Fair Labor Standards Act.

And mark your calendar now so that you will be in Boston in June for the NSPE annual meeting. Full story on the outstanding program begins on page 46.

Kenneth E. Trombley

Editor

Registration Increases in Air Force

During 1958 and 1959, the U.S. Air Force experienced a very substantial improvement in the number of registered architect and engineer employees, civilian and military, throughout its many engineering activities, according to Air Force officials.

For example, at USAF headquarters, there has been almost a 100 per cent increase in the number of registered architects and engineers employed in the Directorate of Civil Engineering during the two-year period. At the present time, nearly fifty per cent of the civilian and military architects and engineers employed by or assigned to that office are registered and the number is increasing each month.

There have been commensurate increases throughout the engineering field activities of the Air Force such as the major Air Force commands and the regional civil engineer extensions of the headquarters.

Correspondingly, there has been approximately a seventy-five per cent increase in the number of memberships in professional and technical engineering societies during the 1958-59 period by employees of the Directorate of Civil Engineering. More active participation by Air Force members at the local and national level is predicted for the future.

Certificates of registration and society membership are proudly and prominently displayed and are credited with a large measure of improved morale and enhanced prestige through letting the public know that the Air Force has a professional staff whose merits are recognized.

These noteworthy improvements have resulted largely from the interest and encouragement of Major General A. M. Minton, the Air Force's director of civil engineering, who has urged his personnel to improve their professional stature and enhance the prestige of the Air Force by obtaining registration, by joining societies and taking an active part in their activities, and by displaying certificates.

'. . . And not a single lawyer'

A story making the rounds in Washington, D.C., is one related by Senator Norris Cotton of New Hampshire.

The Senator tells of a census taken in his home district before the Revolution. A Dartmouth professor filled out the form for the whole county and it read as follows:

"We have a county of 3,000 square miles, a population of 6,549 souls, of which ninety are students at Dartmouth and twenty are slaves. We have 25 incorporated towns, all in thriving condition, including 14 grist mills, 5 saddler shops, 7 millwrights, 8 physicians, 6 engineers, 17 clergymen, and *not a single lawyer*. For this happy state of affairs we take no credit unto ourselves, but render all to the glory of God."

High-Paid Executives Less In Demand, Survey Shows

Big business firms will be looking for relatively fewer high-paid executives in the coming months of 1960 than was the case during the second half of 1959, according to a survey recently completed by a leading management recruitment firm.

Some 145 firms averaging annual sales of $106 million indicated a need for about 2.5 top men per company in the next six months to fill important jobs, reported William A. Hertan, president of Executive Manpower Corporation, New York firm that sponsored the survey. Several months ago a similar inquiry showed large companies wanted an average of 3.2 executives for openings paying from $10,000 to $100,000 a year.

Of the 365 jobs available among the participating companies, the biggest need was for sales executives (27.1 per cent), followed by engineering management (22.5 per cent) and manufacturing/production specialists (18.6 per cent). Mr. Hertan said this represented a decided shift from last year's (June, 1959) poll of 152 firms when large corporations said their primary need was for manufacturing/production executives (25.7 per cent), followed by engineering (23.6 per cent) and sales (23.2 per cent) management.

The answering companies anticipated that the most difficult executives to find would be engineers (fifty-eight mentions).

Engineering Center

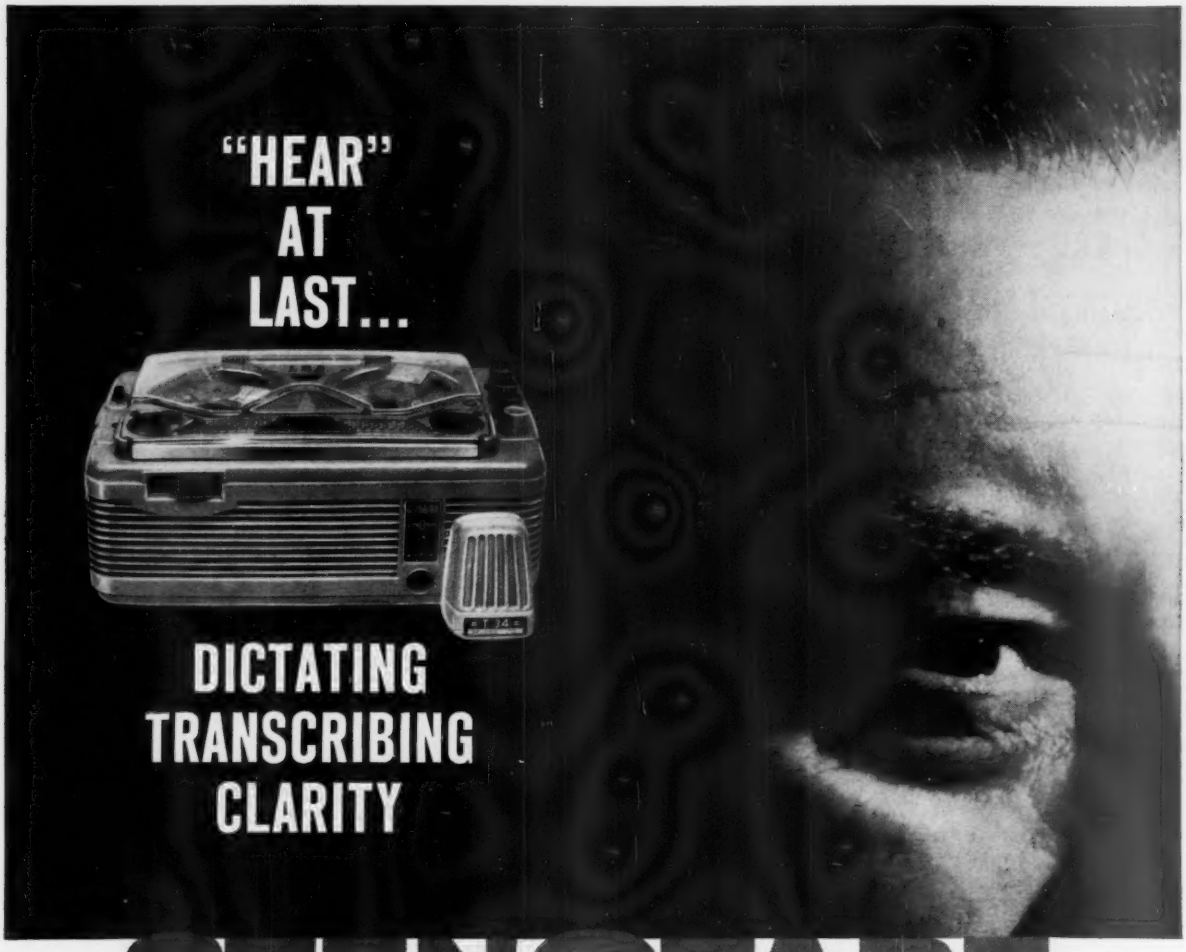
The new $12-million United Engineering Center is scheduled for completion in mid-1961. It will be occupied by representatives of eighteen engineering organizations. The building is located between 47th and 48th Street in New York City.

Women Engineers Plan June Meeting in Seattle

The tenth annual convention of the Society of Women Engineers will be held June 9-12 in Seattle.

All sessions of the convention will be held at the Benjamin Franklin Hotel. General sessions will begin Thursday afternoon, June 9, and will conclude with an afternoon session on Sunday, June 12.

As usual, Executive Committee meetings will precede the general sessions and will be held on Wednesday, June 8.



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Committee Questions Design Costs, Number of Engineers

Following its critical attitude last year on engineering costs by several Federal agencies the House Appropriations Committee has now directed its fire to the number of employees engaged in engineering and design and supervision of construction. However, the Committee has not revived last year's proposal to limit engineering and design costs to five per cent of the construction cost, which was eliminated after protests by NSPE and other engineering societies.

In its latest report on appropriations for the Bureau of Indian Affairs, National Park Service and the Forest Service, the House group comments that the reports submitted by the agencies at the direction of the Committee, flowing from the discarded five per cent limitation question, "indicate that material savings both in construction costs and personnel can be expected from greater use of standardized plans and specifications." The comment does not give any reasons for this belief, however. The appropriations group merely adds that the agencies should be able to effect a minimum reduction of ten per cent in their engineering and design and construction supervision staffs in 1961 to offset at least in part the additional workload contemplated in the agencies' programs.

The agency reports furnished to the Committee generally point to increased programs requiring engineering and construction services in justification of higher costs. The Forest Service, for example, noted that its road and trail program has tripled in volume over the past eight years, requiring more engineers and expects that the programs will continue to expand, requiring an even larger engineering staff.

The National Park Service advised the Committee that it could not state its engineering and design costs as a portion of construction cost because of lack of accounting data for that purpose. However, the agency stated that steps have been taken to "break out" costs for engineering and design for future operations.

An approximate average of eight per cent of total estimated cost of the project for engineering and design and other related technical functions was reported by the Bureau of Indian Affairs. Of the eight per cent, engineering and design costs averaged approximately 3.5 per cent, the agency said, adding that these averages compare favorably with the cost of similar work in other governmental agencies and with work done by private architects and engineers. The report did not specify the items covered by the remaining 4.5 per cent, except that the eight per cent includes all costs directly or indirectly related to the construction of a project from its inception to completion, except for on the job supervision.

The agency said that it had made a change in policy as a direct result of the Appropriations Committee criticism, and after stopping all new construction and analyzing engineering and design costs, had directed that future engineering and design work be accomplished by the Bureau's technical staff. The report claims that this change will result in speeding up of the work and will reduce the engineering and design costs.

The Committee commended the Bureau for its progress in standardizing construction and in reducing costs, and added that it hopes the agency will continue its efforts along this line and effect a material reduction in personnel engaged in engineering, design and construction supervision.

NSPE Urges Congress to Raise Per Diem Maximums

NSPE Executive Director Paul H. Robbins has urged chairmen and members of the House and Senate Appropriations Committees to be wary of setting per diem rates which might limit the quality of experts and consultants obtainable for the performance of vital services.

Mr. Robbins was pleased to note that Federal agencies have been increasing their use of professional engineering consultants for complex or highly specialized tasks, but warned that the recent trend to unrealistic per diem rates makes the performance of consulting work for the Government not economically feasible for the most qualified private practitioners.

Cited as an example were statements by several prominent consulting engineers who said high overhead expenses for labor and material made it impossible to perform engineering services for less than $100 per day. Consequently, stated Mr. Robbins, "the net result of a Federal limitation less than this amount could very well be that the most-qualified engineering firms would refrain from undertaking engineering projects for the Government, leaving the Government's choice to less-qualified consultants. This is a situation in which the Federal agencies can ill afford to be placed."

As evidence that such a pinch is

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already being felt by Federal agencies, the NSPE executive director referred to a recent letter from the Secretary of Commerce to the House and Senate pointing out that the current Department of Commerce appropriations act limits the payments of such individuals to $50 per day, unless otherwise specified by law. "In years past," the secretary noted, "a maximum limitation of $50 per diem (equivalent to approximately $13,000 per annum) has generally sufficed to enable the Department to procure the services of persons who meet Civil Service Commission criteria for experts. In recent years, however, increasing difficulty has been experienced in obtaining the services of individuals who are truly qualified as experts because of the fact that such individuals in private employment now receive compensation at rates substantially in excess of the $50 per diem rate available for serving the Government. In numerous instances the experts whose services are desired receive twice as much as the maximum Government rate, or more. As a result, the Department is handicapped severely in procuring the services of experts and consultants. . . ."

Mr. Robbins cited current per diem rates ranging from $50 to $100 as evidence that a considerable lack of uniformity exists under present appropriation acts and called for the establishment of $100 as the standard per diem rate in all cases, as advocated by NSPE policy. Examples of current rates run from $50 allowable in the Department of Commerce, Treasury Department and other appropriation acts, to $56.50 in the Defense Department act, to $75 for the Interior Department, to $100 in the Department of Agriculture and various other agencies. Mr. Robbins noted that statutes creating the NASA and the Federal Aviation Agency recognize the need for adequate rates and allow a maximum per diem of $100. Also, the National Capital Transportation Act of 1960, introduced by Sen. Bible of Nevada, specifically allows $100 per day for payment of professional services.

Highway Consultants Used As Scapegoats—Rep. Scherer

Representative Gordon Scherer of Cincinnati, ranking Republican member of the House Roads Subcommittee, has charged that recent congressional attacks on corruption in the Federal-aid highway program have been designed to cover up financial difficulties of the program which resulted from congressional political maneuvering.

Speaking before the Highway Functional Section at the Ohio Society of Professional Engineers' convention in March, Rep. Scherer said that charges of over-elaborate engineering design and right-of-way graft are unfounded and resulted from attempts by congressmen and others to divert attention from the failure to provide adequate funds for the program. While pointing out that any program of such magnitude and complexity is bound to contain some waste and inefficiency, the representative stressed that the Blatnik investigating committee fell flat in its attempts to prove charges of wholesale corruption.

In an effort to get the headlines they wanted, Scherer said, the committee "leaked" to the press entirely unsubstantiated stories which he feels have materially affected public confidence in the road program. In support of his charges, the Congressman stated: "It is significant that the findings of the chairman of this investigating committee were prepared and mimeographed by the staff two days before the hearings were concluded—

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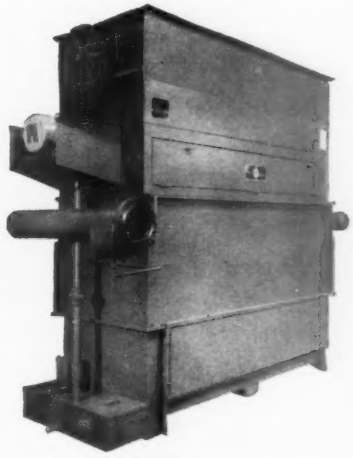

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before the principal witnesses had testified."

In his condemnation of the investigation proceedings, Scherer warned that the resulting bad publicity and the study by Maj. Gen. John S. Bragdon, special assistant to the President for public works, could result in a cutback in the Federal-aid highway program, particularly in urban areas.

Rep. Scherer

Referring specifically to charges that costs of engineering services have been excessive, Scherer gave assurance that in comparison to the total program, provable instances of excessive fees would be few and far between. He further implied that irresponsible criticism of consultants could result in attempts to build up state highway departments so they could perform all the engineering work during the remainder of the program. Such an arrangement, said Scherer, would be extremely costly to the states, since funds necessary to carry large permanent staffs over the slack periods inevitable in such a program would be completely out of proportion to the benefits derived. In pointing out that the inception of the huge highway program would have been drastically delayed without the use of private consultants, he said that the complex engineering work of the program should be done by private enterprise.

"State highway departments," he said, "should be manned with sufficient strength to do basic engineering and to supervise and direct this mammoth highway program. They should not become over-sized engineering bureaucracies." In support of this statement, the Representative pointed out that the nation's toll roads, which have been designed by private consultants, have involved much lower relative engineering costs than comparable projects done by governmental agencies.

In addition to his address before the Ohio Society, Rep. Scherer inserted in the *Congressional Record* a speech given at the recent Mississippi Valley Conference of State Highway Departments by John A. Volpe, first Federal Highway Administrator and current president of the Associated General Contractors of America. Mr. Volpe praised the performance of both state highway departments and consulting engineers on the Federal-aid highway program, and made the following two suggestions for reducing engineering costs on the project: (1) Make greater use of lump-sum engineering contracts. This would eliminate the necessity of keeping records of unit items in detail and on many projects would save substantial engineering man-hours, (2) Delegate more of the inspection responsibility to the general contractor on the job, thereby saving engineering manpower.

Bill Introduced to Define Professions

In a move to reduce the confusion surrounding the terms "architecture" and "engineering," a Virginia legislator has introduced a bill to have the Virginia Advisory Legislative Council study the present statutes and make recommendations for statutory definitions of the two professions.

The author of the bill says the present definitions are not adequate in view of the vital public interest served by the two professions. The *McCamy* case in New Jersey basically raises the same question through a hearing before a special statutory board.

See Page 58 For Information On AE's Readers' Service Dept.

Court Stops Union Pressure On Consulting Employees

The U.S. Supreme Court has left standing the decision of a Federal appellate court upholding a finding by the NLRB that the Operating Engineers Union and certain California chapters of the Associated General Contractors had committed unfair labor practices against employees of an engineering and surveying firm.

In this case the AGC was the prime contractor on a construction project and had a collective bargaining agreement with a local of the Operating Engineers Union. Clauses in this agreement required union membership and made the agreement applicable to subcontractors. The AGC subcontracted some work to the engineering and surveying firm of St. Maurice, Helmkamp and Musser whose employees were represented by the Engineers and Scientists of California.

When Musser refused to compel his employees to join the union, claiming that they were already covered by an agreement with the Engineers and Scientists of California, the union ordered a work stoppage with the result that AGC brought about the suspension of four Musser employees. Upholding the NLRB finding that this activity constituted an unfair labor practice on the part of the union and AGC, the appeals court ruled that the union's strike against AGC brought pressure to bear which carried through as discrimination against Musser's employees, and that the AGC, by succumbing to the union's pressure, discriminated against these same employees when it caused them to be suspended from the construction project.

However, the court also upheld an NLRB finding that the AGC did not commit an unfair labor practice when it later refused to subcontract additional work to Musser because such refusal did not come about as the result of a strike or pressure by the union. Though "there was discrimination by one employer, AGC, against another, Musser, the Act stands aside in respect of such action, forbidding discrimination only against employees."

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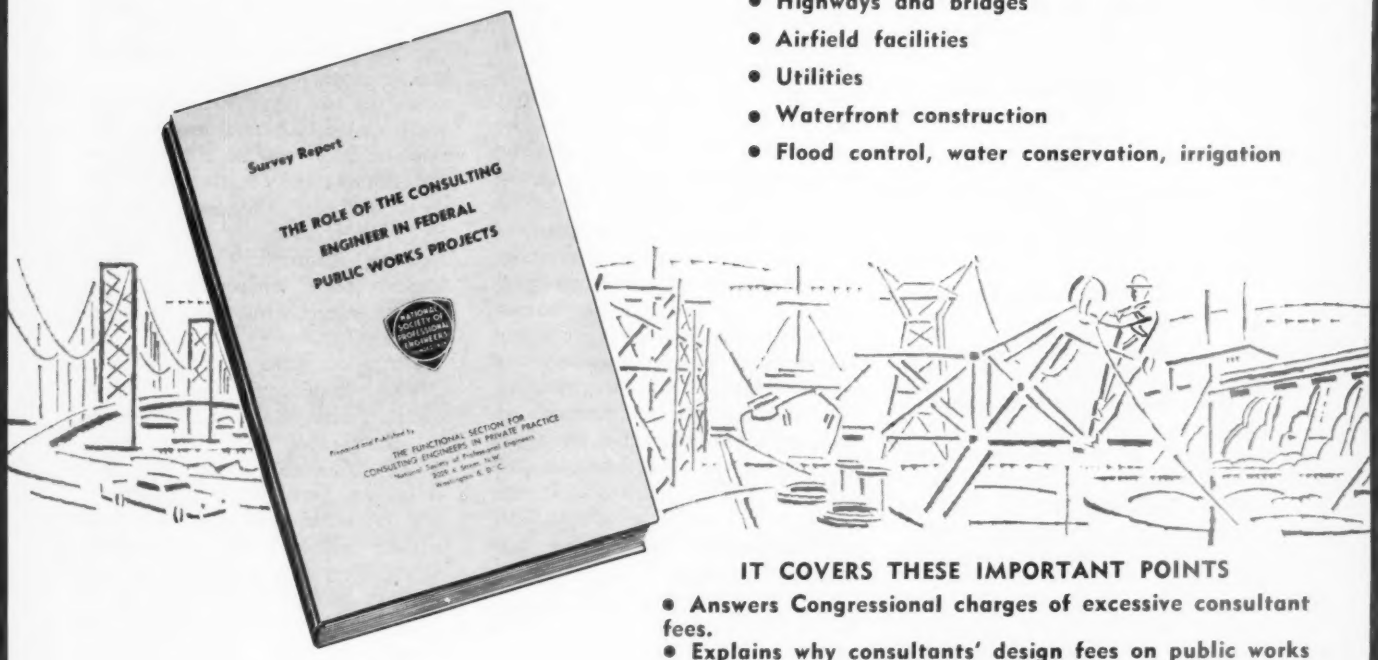
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Engineering—Science Roles Discussed by Top Scientist

The increased recognition accorded to the scientist "has had some unfortunate side effects," including a decline in the public mind of the importance of the engineer, according to the chief scientist of the U.S. Air Force.

Speaking at the awards dinner of the Institute of Aeronautical Sciences' 1960 Northeastern Student Conference, Dr. Alexander H. Flax declared that while science is achieving public recognition and support as an important factor in our economy and our national security, "the importance of engineering has to some extent been eclipsed." Dr. Flax attributed the recent decline in engineering college enrollments "to this cause, at least in part."

Students participating in the conference came from Boston University, Brown University, Cornell University, Massachusetts Institute of Technology, New York University, Pennsylvania State University, University of Pittsburgh, Princeton University, Rensselaer Polytechnic Institute, Stevens Institute of Technology, Syracuse University, and the Polytechnic Institute of Brooklyn.

Dr. Flax said that "because of the loose usage of the term scientist in connection with space vehicles, the public image of the man responsible for space vehicles is that of a physicist or chemist rather than that of an engineer.

"The acclaim accorded to Soviet science on the basis of the demonstrated large payload capacity of Soviet rocket engine boosters is another indication of a tendency to attribute to science what is largely the result of technology," he declared.

Dr. Flax conceded that no one will deny the contributions of physicists and chemists to space propulsion and space vehicles, "but the role of the engineer is a central one and this fact is often lost sight of," he said.

"The importance of engineering science and engineering are certainly not diminished by the steadily increasing output of science and the speed with which this output can be put to practical use," he continued. "To the contrary the richer supply of raw material in the form of basic knowledge is making the job of the engineer ever more demanding, ever more interesting and ever more important. The Air Force in its increased emphasis on science is not losing sight of the importance of applied research and engineering. The applied research program of the Air Force is roughly ten times the size of the basic research program, and the basic research program as you are all aware includes the engineering sciences as well as the pure sciences."

"Dear, the slices don't have to be precisely 1.1875 inches thick."

Two-Week JESSI Program Gets Underway in June

Present tenth and eleventh grade high school students across the nation will have an opportunity of attending one of several Junior Engineers' and Scientists' Summer Institute (JESSI) sessions in June, following the close of school.

The two-week JESSI program is designed to remove the "guess" from school and college program decisions by giving interested high school juniors and seniors an academic insight into the pure and basic applied sciences, and some knowledge of the studies and career opportunities in the science and engineering fields.

Started five years ago at Oregon State College, JESSI sessions are now held on several college campuses across the country. The colleges include: Clemson College; DePauw University; Idaho State College; Linfield College; New Mexico State University; Oregon State College; University of Redlands; University of Utah, and Washington State University.

The respective sessions have been announced to the high schools in the locales which they serve. A JESSI locale includes the host state and, generally, the neighboring states. Students attending high schools which have not received JESSI literature may secure particulars from JESSI, Scientists of Tomorrow, 114 Sylvan Bldg., Portland 1, Oregon.

Tau Beta Pi Alumnus Group Formed in Calif.

A Tau Beta Pi Alumnus Chapter has been formed in Sacramento, Calif., to foster better engineering education in that area.

Organized by Paul S. Reis, a member of the California SPE, the group has grown to eighty-four members. A recent speaker at a chapter meeting was Edwin B. Weinberg, head of the Department of Engineering at Sacramento State College.

Individualism Stressed By General Motors Pres.

Education and business must encourage the individuality of man if we are to retain the tremendous advantages of a free society, President John F. Gordon of General Motors declared recently.

"We need to instill in our upcoming generations a keener awareness of their importance as individuals, a sharper urgency to develop their individuality, a stronger motivation toward learning and a greater willingness to work.

"The freedoms of which we are prone to speak so often and glibly do indeed give us a tremendous advantage," he said, but we can retain this advantage "only so long as we remain firm in our belief in the transcendent importance of man as a unique individual."

The GM president spoke at a meeting of outstanding college and secondary school educators who gathered in Detroit to select more than 100 winners of General Motors four-year college scholarships. Selection is made from more than 20,000 high school seniors throughout the nation. The awards are worth from $200 to $2,000 a year, depending upon individual need. Recipients may select the college of their choice and are free to pursue any course of study they desire. More than 1,600 students now are attending college with GM assistance under General Motors scholarship programs.

Engineering Enrollment Drops Again

For the second consecutive year, enrollment in America's accredited engineering colleges has dropped.

Some 240,063 students were registered in engineering in the fall of 1959; there were 249,950 in 1958, and in the fall of 1957 the total was 257,777.

Under the influence of high enrollments in the mid-1950's, the number of engineering graduates continues to rise; in the year ending in June, 1959, 41,132 degrees were given in various fields of engineering. But a study of recent enrollments would indicate that there will be fewer engineering graduates within the next one or two years, according to the American Society for Engineering Education.

The figures, compiled by the U.S. Office of Education, come from 154 engineering schools in the United States and are assembled each year under a joint ASEE-Office of Education project; they cover all engineering colleges with one or more engineering curricula accredited by the Engineers' Council for Professional Development.

Total engineering enrollment in the fall of 1959 was down four per cent from 1958 and 6.9 per cent from 1957, according to the survey. A decrease in undergraduate enrollment first reported in 1958 continued in 1959 with a 5.7 per cent drop during the year. These engineering enrollment decreases came at a time when total college enrollments were rising—in all, by 10.9 per cent during the two-year period. In 1959 engineering students accounted for only 7.1 per cent of all college students, compared with the high of 8.4 per cent in 1957.

Graduate Study Fellowships Awarded

Almost 1800 high-ability college and university students will be aided in their graduate study in the engineering, sciences, and mathematics through two National Science Foundation fellowship programs announced recently.

The Foundation awarded 1190 cooperative graduate fellowships for the 1960-61 academic year and 580 summer fellowships for graduate teaching assistants for study and research in the summer of 1960.

The approximately 150 cooperating colleges and universities that sponsor the programs originally evaluated applications for these prized awards. A second evaluation was made by thirty-nine eminent scientist-scholars appointed by the National Academy of Sciences-National Research Council. Final selections were made by the Foundation solely on the basis of ability.

Of the Cooperative Graduate awards, 171 were made in mathematics, 268 in engineering, 462 in the physical sciences, including a number in interdisciplinary fields, 254 in the life sciences, and 35 in the social sciences.

Dean Eckel to Retire From Univ. of Colorado

One of the nation's leading engineering educators—Clarence L. Eckel—will retire June 30 after forty-six years of service, nearly all at the University of Colorado.

Eckel, who is 68, has been a member of the University's faculty since 1914. He currently is professor of civil engineering and dean of the College of Engineering.

He is a former president of the National Council of State Boards of Engineering Examiners.

Job Offers Average $525 at Case

This year's Case Institute of Technology's graduating class has received job offers averaging $525, it has been announced. Because all offers have not yet been made, it is expected that this figure will be somewhat higher by graduation time. Average salaries for the 1959 graduating class were $501. In 1958 they were $484.

Graduates in electrical engineering and engineering sciences tied for highest average salaries, each averaging $532 per month. The highest job offer received was by a graduate in the Department of Mechanical Engineering who was offered a salary of $750 a month.

Mechanical engineers were in third place, with salaries averaging $531 a month. Physics majors were also in great demand with job offers at $527 a month. Graduates of the Department of Management and Civil Engineering had the lowest average job offers although both of these were above $500 a month.

Civil Service Comm. Raises Starting Pay for Engineers

- Grades 5 and 7 to Receive Increases
- Expected to Aid Federal Recruiting

The Civil Service Commission has announced that effective this month minimum pay rates for GS-5 and GS-7 engineers and certain physical science positions will be raised to the top step of the grades—$4,940 and $5,880, respectively. Current rates of pay for these positions are $4,490 at grade 5 (4th step) and $5,430 at grade 7 (4th step).

The Commission expects that the adjustment will be an aid to the Government in recruiting about 3,200 engineers and 1,200 scientists during the next year, at an estimated additional cost of $1,980,000. In addition, approximately 8,700 engineers and scientists now serving in grades 5 and 7 will have their pay adjusted under the new formula, at an estimated first-year additional cost of $2,214,900.

Under existing law, the CSC is authorized to raise pay rates within Classification Act pay grades when the Government is at a competitive disadvantage with private employers and the Federal need is acute.

Findings from the annual CSC survey of Government and industry experience in the recruitment of employees in shortage-category fields, showed a decrease in acceptance rates by persons offered Federal employment and a widened gap between industry's median starting pay and the rates Government agencies could offer for these jobs. The Commission also reported that evidence is accumulating that private employers will offer still higher salaries to June, 1960, graduates in the shortage fields.

The CSC specifically noted a drop in the Federal acceptance rate for engineers from 37 per cent in 1958 to 31 per cent in 1959, while industry's acceptance rate in 1959 decreased only three per cent—from 46 per cent in 1958 to 43 per cent in 1959. It was pointed out, however, that the Government's experience actually was less fruitful than the statistics reflect, because many of the top-quality engineer and physical scientist candidates interviewed by Federal recruiters indicated their disinterest—primarily because of the salary—even before an offer of employment could be made, so that they were not recorded in the acceptance-declination tabulation.

Positions in addition to engineering covered by the Commission's order include architecture, landscape architecture, physics, geophysics, chemistry, metallurgy, mathematics, patent examining, patent adviser, astronomy, meteorology, geology, geodesy, actuary, oceanographer (physical), mathematical statistician and technologist (eight specific specialties).

It is reported that the Commission is also giving consideration to possibly raising the minimum salaries for engineering and physical scientists positions above grade 7.

Senators Urge Extention Of Air Pollution Act

Senators Kuchel and Engle of California and Senators Clark and Scott of Pennsylvania have joined together to sponsor a proposal to extend the Air Pollution Control Act for an indefinite period and to provide for public hearings on air pollution problems of more than local significance. The bill would also remove the present $5 million ceiling on annual appropriations.

In a speech on the floor of the Senate, Senator Kuchel declared that "air pollution is not a temporary problem but one which is almost certain to require continuing attention in the interests of public health, safety and comfort." He added that his proposal would "equip Federal agencies and officials with broad authority to assemble and utilize all the resources of our Government in comprehensive studies, investigation, and experimentation to devise means for controlling and eventually wiping out the threat of polluted air from American communities." (S. 3108)

Bill for Uniform Patent Policy is Introduced

Senator Joseph C. O'Mahoney of Wyoming has introduced a bill to make certain that a uniform policy is followed by all departments and agencies of the Government with respect to patents which are the product of research and development contracts with Federal agencies. The O'Mahoney bill would provide that no provisions granting the contractor exclusive commercial rights to any inventions could be included in the contract

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unless a determination were made that it would not adversely affect the research program of the U. S.

Responsibility for making such a determination would rest with the National Science Foundation, with the Department of Justice required to give its opinion as to the probable effect of the provision upon competition in the field of technology to which the contract relates. (S. 3156)

Present Federal patent policies on research and development contracts generally fall into two broad categories: (1) The Government takes title to patents developed by private concerns unless it is determined that the public interest is better served by a waiver of the rights. This is basic policy under the Atomic Energy Act of 1954 and the National Aeronautics and Space Act of 1958. (2) The contractor obtains the patent and the Government receives a royalty-free nonexclusive license to practice or have practiced any inventions conceived in the course of the work. This is the prevailing practice in the administration of research and development contracts entered into by the military agencies.

Senator O'Mahoney has declared that if there is to be any patenting at all of the products of basic research, "it would seem desirable for the Government, rather than private contractors, to hold title to the patents and for the Government to have freedom of accessibility and the right to disseminate the resulting scientific and technical information."

House bills introduced by Representatives Frank Thompson of New Jersey and Harris McDowell of Delaware would take a different approach and establish a uniform policy to provide that patent rights would be granted to the contractor with the Government retaining a royalty-free license. Referring to Government patent policies as a "mess," Rep. McDowell called for a general overhaul of the system, especially since Government funds devoted to research have grown rapidly in recent years to the point where the total obligation for scientific research and development of all Federal departments for 1960 is estimated at over $8 billion. (H.R. 5448 and H.R. 7705)

Federal Pay Increase Alone Will Not Solve Problem-NSPE

An across the board percentage salary increase alone will not get to the heart of the Government's basic problem in recruiting and retaining adequate numbers of qualified engineering and scientific personnel, a representative of the National Society has testified in Congressional hearings on proposals for a Federal classified pay raise.

Executive Director Paul H. Robbins told members of the House Committee on Post Office and Civil Service that what is needed is the "development of a salary system which is attuned to changing market conditions and which would permit the Federal Government to adjust salaries promptly and effectively as circumstances warrant."

Mr. Robbins emphasized that "the adoption of an effective flexible salary system will materially and significantly aid in solving recurring problems with respect to engineering and scientific personnel by assuring that Federal pay scales keep pace with those in private industry."

Mr. Robbins called attention to data gathered in the biennial Professional Engineers Income and Salary Surveys conducted by the National Society which showed that salaries for Government engineers lagged considerably behind those in industry from 1952 through 1958.

"Recent figures show," Mr. Robbins said, "that the spread is becoming wider again as salaries in industry increased appreciably in 1959 to meet competitive conditions."

Mr. Robbins suggested five principles which might be considered in developing legislation involving Federal salaries for engineers and scientists:

1. Basically, procedures should be established vesting authority in agency heads, if practical, to set starting rates of pay for engineers and scientists at a level which competitively compares with the then-prevailing starting rates in industry and other fields employing substantial numbers of engineers. The numerous surveys presently conducted annually by responsible authorities, plus data to be gathered by the Bureau of Labor Statistics, should provide meaningful guidelines in carrying out this authority.

2. Recognition should be given to the exceptionally high demand for certain categories of engineers and scientists, particularly in new and highly-specialized fields. Consequently, salaries for individuals in these groups should be set at a level which (a) Acknowledges the critical need for their talent, and (b) Compares competitively with salaries they could expect in non-governmental employment.

3. Procedures should be established for quickly, efficiently and effectively adjusting salaries for engineers and scientists as nongovernmental rates for comparable employees change. This will aid recruiting, but more importantly, assure the continued employment of experienced personnel, particularly in more responsible positions.

4. Provision should be made for recognizing, by salary adjustments, outstanding ability, merit, job performance and responsibility. The inability of Federal agencies, under the Classification Act of 1949, to compensate individuals for outstanding competence, except by promotion, is one of the serious shortcomings of the present system which should be corrected.

5. The artificial distinction between the so-called "super grades" —GS-16, 17 and 18—and the other 15 grades of the General Schedule, should be eliminated. The number of high level, career positions in the Federal service, particularly those requiring engineering and scientific background, should not be limited by statute.

Phillips Petroleum Company Receives Industrial Award

- Top Professional Development Program
- To Receive Plaque at Society Meeting

The Phillips Petroleum Company has been selected to receive the first annual Industrial Professional Development Award of the National Society of Professional Engineers.

The Award, an engraved plaque, will be presented at the NSPE annual meeting in Boston, June 8-11.

A five-member National Society Industrial Award Committee selected Phillips because of its "outstanding advancement and improvement in the development and application of forward-looking engineering employment practices."

The Committee found that Phillips engineering employment practices included a definite encouragement of such things as registration, education and technical training, the authoring of published material, professional working conditions, the utilization of engineering manpower, the use of engineering titles, and the improvement of engineer-management communications.

Phillips, with headquarters in Bartlesville, Oklahoma, currently employs 2,060 graduate engineers. The turnover rate of Phillips engineers and scientists for 1959 was 5.2 per cent.

In evaluating Phillips Petroleum's engineering employment practices, the Award Committee found that the firm urged engineers to participate in technical courses offered by universities and colleges, held numerous technical information programs at company expense and on company time, assisted engineers in the publication of technical papers, and encouraged active membership in engineering societies.

Phillips provides time off with pay to those engineers required to take registration examinations, and pays all costs in securing initial registrations as well as the costs for registration seals and renewal fees.

The Award Committee also cited these Phillips engineering employment practices:

—Every effort is made to place engineers on technical and administrative work with nontechnical assistants performing the routine and nontechnical duties.

—Many engineers have private offices; others share offices with one to three other engineers. Those in larger offices are provided with partial height unit partitions.

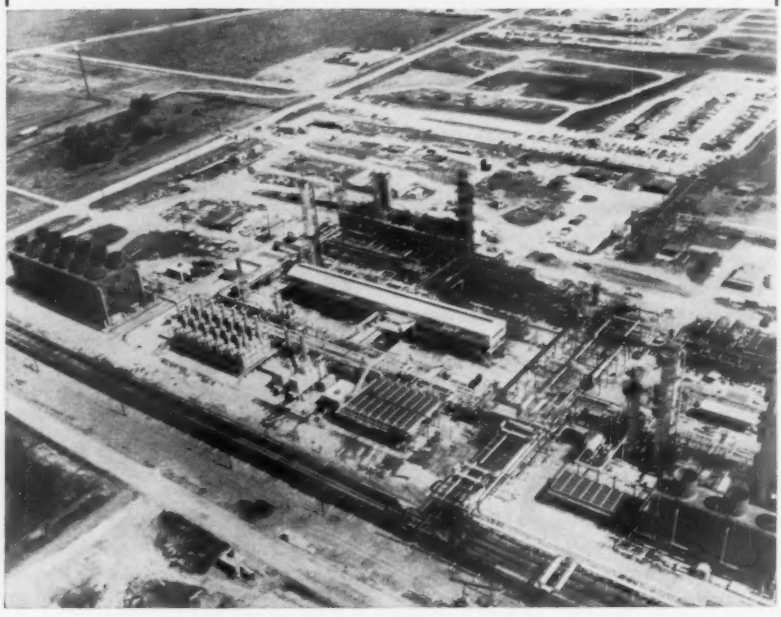
—Stenographic, clerical, and other nontechnical assistance is provided, and engineers have immediate access to telephones, adding machines, dictating equipment, reference material and storage space.

—Engineers are under a formal salary plan based on job evaluation, they are paid on a monthly rate basis, and pay checks are personally delivered to the engineer by his supervisor or appropriate personnel officer, or are mailed or deposited to his bank account.

—A detailed job description and specific job title which rules out the use of engineering titles for nontechnical or subprofessional engineering jobs.

In addition to the general personnel policies of the firm, the

Phillips Petroleum Subsidiary



Phillips Petroleum Company—an employer of more than 2,000 engineers—is the first recipient of NSPE's Industrial Professional Development Award. A subsidiary of the company, Phillips Chemical Company, Sweeny, Tex., shown above, is just a part of the firm's vast operation.

professional engineer at Phillips has the advantage of certain special practices such as: More liberal time off to pursue education, attend society meetings, or take engineering registration examinations; reimbursement of expenses for moving costs upon initial employment; special training and counseling programs; signing names to letters and affixing signatures and seals; especially diligent investigation of request for transfers, and the use of separate job application forms.

Lump-sum rewards are made for patentable ideas, and progression and recognition are provided for the highly skilled engineer-scientist outside of the administrative organization. Phillips engineers holding committee positions or offices in technical societies travel at company expense and on company time to perform society business.

Phillips Petroleum was selected for the Award from nominations of industrial firms throughout the U. S. by local chapters of the National Society. The Award will be presented by the NSPE president each year in June at the annual meeting.

The five professional engineer members of the Industrial Award Committee are: Robert A. Blackburn, manager, strategic materials section, engineering and construction division, Koppers Company, Inc., chairman; Louis J. Larson, consulting engineer, Welding Industries Group, Allis-Chalmers Manufacturing Company; Wayne E. Ault, manager, technical department, "Automatic" Sprinkler Corporation of America; George Steven, general manager, Worthington Corporation, and R. F. Danner, vice president, research and development, Oklahoma Gas and Electric Company.

Professionals, Technicians Split in Ladish Union Vote

A split decision in an NLRB election at Ladish Company, Cudahy, Wisconsin, found the Technical Engineers Association winning in the technical unit by a vote of 111 to 93, but losing in the professional unit 24 to 7.

In the professional unit, the vote on whether or not to be counted with the technical unit on the representation ballot was 26 to 5 in favor of separation. All of the professionals who voted against the union also voted for separation. A post-election tally reveals the significance of the separate-vote rule, for if the professional employees had been included in the same election unit as the technicians, the union would have won representation of the entire unit by the margin of one vote, 118 to 117.

Sperry Union Seeks Affiliation with IUE

An unusual clause in the collective bargaining agreement between the Sperry Gyroscope Division of Sperry Rand Corporation and the independent Engineers Association puts in doubt the outcome of a vote sought by EA to affiliate with the International Union of Electrical, Radio and Machine Workers, AFL-CIO.

A clause in the collective bargaining contract requires the union to conduct an election in the entire bargaining unit (as distinguished from the membership of the union) before it can affiliate with any union representing production or maintenance employees. The current EA membership is less than one-half of those it represents, raising the question of whether the union will be able to raise the votes necessary to carry out the intent of its resolution.

The resolution of EA seeks affiliation with IUE on grounds that the immediate formation of a national engineering union is desirable, and points out that IUE is trying to create an engineering employees council in the AFL-CIO.

Another significant feature of the action of the Sperry union leadership is an acknowledgement that the proposed Engineers and Scientists Guild has not and will not achieve reality. The ESG was sponsored by the Sperry union as a rival to the Engineers and Scientists of America. ESA, the Sperry resolution says, "is slowly disintegrating." In the view of the resolution, with the failure of ESG and the disintegration of ESA the electrical workers' union "affords the best avenue for creation of an active, viable engineering employees organization with national stature."

NSPE Urges Amendment of Fair Labor Standards Act

Labor Standards Subcommittee members of the House Education and Labor Committee have been asked by the National Society to consider amending the Fair Labor Standards Act to accord to registered professional engineers the same status presently granted licensed doctors and lawyers who are excepted from the minimum salary requirement for professional employees.

In a communication to Representative Phil M. Landrum, chairman of the Labor Standards Subcommittee, an NSPE spokesman asked the Congress to curb the Wage & Hour Administrator's "discriminatory actions toward professional engineering, and to extend to that worthy endeavor the same professional status and recognition accorded law and medicine."

Under regulations issued by the Administrator for employees in a bona fide professional capacity there is a requirement known as the "salary test" which presently states that professional employees must earn at least $95 per week.

This test does not apply—according to the Administrator's ruling—to licensed doctors or lawyers who are actually engaged in the practice of their professions.

The Society pointed out that "since every state legislature and since the Congress of the United States has declared the professional status of licensed engineers, we respectfully suggest that there is no justification or warrant for the Administrator to ignore that fact in providing the special exception from the salary test for licensed and certified professionals."

NSPE also called attention to the "rapid development of the engineering profession which is now in the forefront of professional actitives directly related to our national economy and national defense."

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The Southwest—Engineers New Land of Promise

From Bustling Houston to Sunbaked Albuquerque, From Desert to the Gulf, This is Boom Territory for the Engineer!

THE American engineer may never replace Wyatt Earp as the idol of the television set, but he has definitely become part of the scenery of the new Southwest.

These Southwestern states—once the almost exclusive domain of cattle and the oil derrick—are demanding an increasing share of the nation's top engineering brains to man an industrial empire that has seen phenomenal growth in recent years.

Aircraft manufacturing, electronics, research, missiles, and dozens of other industrial developments many long identified with the industrial East, have cropped up on the plains of Texas, Oklahoma, New Mexico, and Arizona. With this burgeoning industrial and population development have come thousands of engineers representing every field of the profession. Today, the engineer is as much an integral part of the Southwestern development as was the grizzled cowhand of a century ago.

Engineers and the Southwest, of course, are long-time partners. Certainly the multi-billion dollar petroleum industry owes much to the engineer. And water development—the very life line of much of this region—depends heavily on the engineering profession. But the presence of the industrial engineer in large numbers is something relatively new for the Southwest and the West. Traditionally the mass of the engineering population has been centered in the industrial areas of the East and Midwest, but this is obviously undergoing rapid change.

Hundreds of the nation's top engineers are being attracted from the older industrial centers to fill the needs of the Southwest's new look. Engineering recruitment advertisements lauding the climate and the opportunities of these

Industrial Dallas . . .

Arizona Grows for Engineers . . .

A huge complex, AiResearch Manufacturing Company.

Near Phoenix, Reynolds Metals stretches across the flat land.

Western states dot the classified pages of national publications. Many of the area's leading engineers are home-grown products off the campuses of truly outstanding engineering schools of the Southwest.

The Southwest has its share of conventional industry, but much of the new development has taken on something of a "futuristic" air lacking in some of the older industrial communities. The area is heavily sprinkled with defense plants, advanced research centers, electronics companies and other so-called "Space Age" industries. These industries of the future, with their high percentage of professional technical staffs, tend to make the Southwestern states even more of an engineering mecca.

Texas Instruments, a giant electronics company at Dallas is a prime example of the region's new industrialization. TI has shown amazing growth—its total employment increased by more than three times since 1957—and today is one of the big prides of the industrial department of the Dallas Chamber of Commerce. Nearly twenty-five per cent of Texas Instruments' 15,000 employee payroll is made up of engineers.

The rapid growth of this Dallas based plant has created big demands for top-grade engineer talent, a demand which the company says is becoming easier to fill.

"Engineers are showing less hesitancy now about moving to what was once incorrectly envisioned as a land of 'sunbaked sand and sagebrush'," says Don McIver, manager, of public relations for Texas Instruments. "A better general understanding of the climate and

The Sperry Phoenix Co., another large employer of engineers.

Motorola, Inc., is still another Arizona industrial resident.

living conditions and the recreational, educational and cultural advantages, particularly in the Dallas and Houston metropolitan centers, has been very beneficial in recruiting."

Dallas, which prides itself on being one of the more cosmopolitan cities of the Southwest, has for many years been an important industrial and market center for the region. But Space Age industries like Texas Instruments are giving a new industrial look to this metropolitan center in North Texas.

The city's heavy demand for engineers apparently won't slack off in the near future. In a prediction of the city's total manpower needs, the Texas Employment Agency recently predicted that Dallas would require more than 6,200 additional engineers by 1965. The figure is a third of the new job needs for professional workers in the next five years.

Dallas' chief rival forty miles to the west—Fort Worth—provides a more concrete example of what industrialization has done to the image of the West as a sagebrush paradise for the cowboy. Fort Worth, probably more than any major Texas city, has always typified the State's historical ties with the old West. Today, Fort Worth still looks with pride on its Western background, but it is fast becoming a place where you are more likely to meet an engineer than a cowboy fresh from the West Texas range.

Fort Worth has become a major industrial center in the past fifteen years. With the Convair division of General Dynamics and Bell Aircraft in its midst, the city is a large aircraft manufacturing center. Convair, alone, employs more than 20,000 workers in its sprawling 543-acre plant near Fort Worth.

Not all of Fort Worth's new industry is as big or as exciting as Convair's supersonic jet manufacture, but the city is continuing a steady growth that is drawing more and more engineers into its midst. In 1948, the city had a manufacturing payroll of slightly more than $83 million; ten years later that payroll had skyrocketed to $283 million. Population has moved upward with the industrial boom, jumping from 278,000 in 1950 to an estimated 400,000 in 1959.

But, the population leader and the granddaddy of Southwestern growth is bustling Houston in southeast Texas. A center for the area's gigantic oil and chemical industries, Houston today is near-

Deep in the Heart of . . .

Shown is Bell Helicopter's Ft. Worth plant.

This is the award-winning plant of Texas Instruments, Inc., at Dallas.

The 543-acre grounds of Convair's Ft. Worth division.

To Albuquerque . . .

This new $4 million products line runs from Amarillo to Albuquerque.

ing a million in population and has yet to reach the peak of its industrial growth. With the third largest seaport in the U. S., this Texas city already far outstrips many of the older industrial centers of the northern U. S.

Houston calls itself "America's Industrial Frontier" and today there are fewer and fewer persons who will argue with this Chamber of Commerce slogan.

Some of the nation's best brains in the chemical engineering fields list the Houston area their home. They have moved into this coastal area to meet the needs of a chemical industry that has mushroomed since World War II. The Houston area claims more than eighty-five per cent of the nation's petrochemical activity.

Houston probably is best known as an oil capital. Hundreds of the nation's leading producers have their headquarters here and some of the biggest refineries lie along the Gulf Coast which is dominated by Houston. The city is also a major manufacturer of oil field tools and machinery.

Despite its reputation as an oil center, Houston does have a diversified manufacturing operation. A survey conducted last year revealed 1,600 manufacturing concerns in the immediate Houston area with an employee roll of nearly 100,000.

The western edge of this growing Southwestern empire—Arizona—is somewhat newer to the business of industrial development, but it has obviously caught on fast.

In the first post-war year of 1946, Arizona turned out only $86 million of manufactured goods; last year the figure was estimated at more than $500 million. The heart of Arizona's growing industrialization in the past 15 years has been Phoenix, a sprawling city in the Valley of the Sun.

The area's industrial growth got its first big start in World War II when Goodyear Aircraft moved into a government-constructed plant to support its West Coast factories. Later, Goodyear purchased the plant from the government and today it is one of the most important defense units in the Southwest.

AiResearch is another big company which came to Arizona in World War II and liked the area well enough to return in 1950. Now AiResearch with more than 3,700 workers is the area's largest employer. The company maintains more than 650,000 square feet of engineering and administrative offices, machine shops, assembly areas and test facilities on ninety-one acres in the Valley.

Reynolds Metals got into the Phoenix industrial picture by purchasing the old wartime Alcoa Aluminum plant. It is now the world's largest aluminum extrusion plant and provides employment for 2,600 workers.

More recently, General Electric moved its computer division to Phoenix, picking the new Deer Valley industrial area as the site of its operation. In July, 1957, Sperry-Phoenix, a division of Sperry Rand, built its sleek $3 million plant in the same area while U. S. Semi-Conductor was putting up a $1.5 million plant. Both GE and Sperry have recently completed major enlargements of their facilities.

Only this year Cannon Electric Company moved into its new 100,000 square foot plant next to the Sky Harbor Airport and began production of a line of electronic and electrical plugs used in commercial instruments and missiles. Solid State Electronic Controls, Inc., a subsidiary of Controls Company of America, is also moving into the Phoenix area.

PHOENIX is an excellent example of the new industrial look that has

(Continued on page 54)

Oklahoma Cement . . .

An aerial view of the Ideal Cement Co. at Ada, Oklahoma. The new plant is in the foreground.

FROM WASHINGTON

BY
MILTON F. LUNCH,
N.S.P.E.'s Legislative Counsel

► Coast Guard Bill Cuts Engineer Post

The anachronism surrounding the place and importance of engineering as sometimes seen through official eyes is well-illustrated in a pending piece of legislation which in general seems to be highly desirable and noncontroversial. The bill is to amend the basic law in order to improve the operation and efficiency of the United States Coast Guard. But one of the proposals in the bill, prepared and backed by the Coast Guard and the Treasury Department (which administers the Coast Guard in peacetime), would abolish the statutory office of Engineer in Chief. This position has had statutory standing for more than sixty years and its functions assume particular importance as the Coast Guard increasingly relies upon technological devices and systems to perform its mission.

Although the House Committee on Merchant Marine and Fisheries has gone along with the proposal, the report expresses the group's "belief in the great importance today of a strong and vigorous engineering component in the Coast Guard." To this the House body added: "The rapidly accelerating progress of technological developments in all the fields of concern to the Coast Guard make it imperative that its organization be both qualitatively and quantitatively competent to meet its increased responsibilities efficiently and effectively. The committee's adoption on this recommendation is predicated upon this understanding."

NSPE has expressed its concern over the suggested move, declaring that the abolition of the statutory base for the Engineer in Chief "may prove highly detrimental to the Coast Guard in terms of obtaining and retaining the highly-qualified career engineering personnel so vitally needed by that service." Although not the intent of the sponsors, NSPE added that the move would tend to impair the recognition and prestige of engineering in the service, and harm recruiting efforts. The Senate Interstate and Foreign Commerce Committee has the bill under consideration after hearing several protests on the proposed abolition of the Engineer in Chief position.

◄ NSPE Hits 'Salary Test' For Professionalism

The House Education and Labor Committee is considering legislation to raise the minimum wage and extend the coverage of the Federal law. Professional employees are exempt from the minimum wage and overtime provisions, but it has been left to the Administrator to establish the qualifications for such exemption. In addition to a general definition in terms of work performed, the Administrator has always used a minimum salary test—now $95 a week. But the rub has been that the salary test does not apply to licensed doctors and lawyers. NSPE and other professional societies have protested the discrimination to no avail. Now several professional societies, including NSPE, have asked the House Committee to prohibit the discrimination in the revised law by forbidding the amount of compensation to be used as a test of professional status for licensed doctors, lawyers, professional engineers or certified public accountants.

Draft Board In Dispute Over Deferred Math Grad ►

Lt. Gen. Lewis B. Hershey, director of Selective Service, has suspended a draft board in Virginia following a dispute over the deferred status of a graduate student in a critical field of study—mathematics. The registrant in question had taught mathematics in a public school for 3½ years and then won a National Science Foundation scholarship. Nevertheless, the local draft board insisted that he be classified 1-A. The registrant's appeal was denied by the state and national appeal board, but upon further appeal to National Selective Service headquarters, the local board was ordered to re-open the case. The local board refused, hence the suspension. General Hershey said he was not trying to classify the graduate student but at the heart of the dispute is the question of educational deferments. The local board members complain that if the registrant is deferred until he completes his graduate work he will be over twenty-six and beyond the draft age limit. Is equality of military service more important than advanced training in a discipline deemed vital to the nation?

◄ Rep. Barden, NSPE, Oppose 'Common-situs' Bills

Rep. Graham A. Barden, chairman of the House Committee on Education and Labor, has advised NSPE that he is "bitterly opposed" to the enactment of the so-called "common-situs picketing bills." The proposed amendments to the Taft-Hartley Act, approved by the House Commitee, twenty-one to five, would allow building trades unions a special exemption from the prohibition of secondary boycotts. The unions want the special right so they can close down an entire construction project if any contractor or subcontractor on the project is "nonunion."

NSPE has advised the House and Senate committees of its concern that the legislation might jeopardize the rights of professional employees in the construction industry, citing several recent California cases in which employees of engineering and surveying firms had been the subject of coercion by a building trades union. Such coercion is now illegal and was enjoined by the NLRB, but the "common-situs" bills would allow such conduct. The major fight will be on the floor of the House.

National Science Academy Proposed ►

A bill by Rep. Victor L. Anfuso of New York, a member of the House Science and Astronautics Committee, to create a National Science Academy, will be the subject of hearings shortly. The author has asked NSPE to comment upon his proposal and the Society plans to testify. The proposed institution would be modeled on the Military Academy and engineering and science graduates, in return for their free education, would be required to accept a five-year appointment as a civilian or military officer of the United States. Rep. Anfuso was the author of the bill, now law, creating a Medal of Science and has recently moved to restore the provisions for monetary reward, in addition to the Medal, which had been stricken from his original bill.

◄ Sen. Carlson Presents Kansas Water Resolution

A resolution of the NSPE-affiliated Kansas Engineering Society on development of the nation's water resources has been referred to the Senate Committee on Interior and Insular Affairs. Senator Frank Carlson of Kansas presented the resolution, with reference to the future growth and development of the state being determined largely by the amount of water which can be conserved and used for beneficial purposes. The KES resolution calls for enactment of Federal legislation to improve uniform standards, coordinate Federal activities, accelerate basic data collection and provide for maximum development of reservoir sites.

The Sanitary Engineer— Most Professional?

By
FRANK A. BUTRICO, P. E. *
Dept. of Health, Education, and Welfare
Washington, D. C.

and

WESLEY E. GILBERTSON, P. E. †
Dept. of Health, Education, and Welfare
Washington, D. C.

In view of the tremendous advances in science and technology, the engineer's role in society is increasingly strategic. The public is greatly and gratefully impressed by these advances but frequently does not appreciate the engineer's contributions. Many of the engineer's colleagues in other fields also lack this appreciation. It is up to the engineer to explain the nature of his work more clearly. This needed explanation involves, and is a part of, the concept of the professional person.

Much has been written and said about professionalism in the engineering field. No unanimity exists as to the nature and extent of all the ingredients that go to make up the "professional engineer." Certainly this appellation involves more than technical competence. It is equally obvious that engineers should have greater status than they now enjoy among other scientific groups and the general public. In order to gain this higher status, engineers must look to the earmarks or benchmarks which consensus seems to have established.

In our opinion the following attributes should characterize the professional engineer: individual initiative, judgment and discretion, a sense of responsibility, ethical conduct, and the desire to elevate society. It must be admitted, however, that it would be desirable for *all* individuals who work for a living in our society to possess these attributes, whether they be professional or not. Certain additional requirements of a more practical and specific nature are obviously necessary to distinguish the engineer from the sub or semi-professional person. Clifford F. Rassweiller, past president of the American Chemical Society, identified them clearly when he said: "The more desirable types of professional status gain stature because they demand an education which is materially greater than that required by other occupations . . . we are rapidly approaching, if we have not already reached, the stage where a four-year college education is a mass production item, and one can no longer stand apart in our civilization as an especially learned individual simply by holding a bachelor's degree. . . . True professional status is also characterized by the willingness of professional men to work to advance their own profession or science. Professional men belong to professional and scientific societies, attend local and national meetings, and take part in committee activities." To education and professional society membership can be added registration and publication in journals of the particular field. To *these* four marks of true professionalism the engineer can profitably address himself.

Assuming these marks of criteria to be valid, we have made inquiry into how one group—the sanitary engineers—tries to meet the qualifications of genuine professional status. In trying to "fill the bill of particulars" that distinguishes the professional engineer, some efforts of this group have been successful and others have not. Yet the data may be instructive.

If the sanitary engineer has an ancient origin in comparison, for example, with the chemical or aeronautical engineer, he has at least taken seriously the demand for greater background, skill, and talent as required by modern society. Not too long ago, the sanitary engineer focused most of his attention on the relation of water quality and quantity to the health of the community and the nation. But with the rapid development of new knowledge, and the equally rapid appearance of such problems as atmospheric pollution and radiological health hazards, it became obvious that the sanitary en-

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* *Frank A. Butrico, sanitary engineer director, is chief of the Office of Engineering Resources in the Division of Engineering Services of the U. S. Public Health Service.*

† *Wesley E. Gilbertson, sanitary engineering director, is chief of the Division of Engineering Services in the U. S. Public Health Service.*

The sanitary engineer is a driving force in the life of any community. Shown is Denver, Colorado's, $35 million Courthouse Square development when under construction. It includes a hotel, department store, plaza and garage.

gineer's education and training had to be extended.

As a result, the sanitary engineer is rapidly becoming a master's degree man. Of the schools currently offering sanitary engineering, only three have undergraduate programs and forty have graduate programs. For the 1957-58 academic school year, half of all the sanitary engineering degrees awarded were graduate degrees. This compares with the high of sixteen per cent which were master's degrees of all engineering degrees awarded in 1955 as compiled by the U. S. Office of Education. Of all sanitary engineering degrees awarded since 1900, two-thirds of all master's degrees and three-fourths of all doctor's degrees were acquired in the last 10-12 years. If the present trend is projected, two of every three sanitary engineering degrees awarded will be graduate degrees in another fifteen years. In a recent survey made of some 4,500 sanitary engineers (believed to represent about two-thirds of the estimated known total of all such in the country), thirty-eight per cent reported having the master's degree. This compares very favorably with the twenty-three per cent and fifteen per cent as reported in 1955 studies by two other engineering specialties.

Registration is regarded as another mark of professional status. A leading newspaper editor and journalist states quite bluntly: "We will get just about as much professional recognition as we are willing, figuratively, to buy. The coin with which we buy is regulation—regulation by the profession itself or by some other agency—the setting up of standards and the supervision of them."[1] Every state in the Union has licensing and registration requirements for engineers, in many cases requirements as exacting and standards as high as those governing the practice of medicine. Personnel policy of many governmental agencies at all levels has given increasing recognition to the value of registration and licensure in employing engineers. The Civil Service Commission has accepted registration as one of the qualifications of employment by the Federal Government, without examination, in grades GS-12 and below.

It is worth noting that industry, which has always appraised the engineer strictly in terms of whether or not he can "produce," responded to a survey conducted by the Los Angeles Chamber of Commerce with some pointed observations on the desirability of enhanced professional status. It was the consensus of leading business-industry representatives that "industrial executives should urge the professional legal registration of all qualified engineering personnel. Legal registration gives added professional status to the engineer."

The Engineering Resources Unit of the Division of Engineering Services has steadily pressed for more Public Health Service engineers to register as part of its comprehensive program of activities on behalf of the education, training, and other aspects of engineering development as a profession. As one result of this continual interest, a recent survey of some 348 Federally employed sanitary engineers (an 88 per cent response) disclosed that 52 per cent in the upper grades of the reserve corps were registered, 77 per cent of those in the regular corps in higher positions were registered, and 80 per cent of the responding engineers employed through the Civil Service were registered. In the survey of 4,500 sanitary engineers referred to earlier (and remember that these are judged to represent two-thirds of *all* sanitary engineers in the country), more than seventy-five per cent reported themselves as registered in at least one state or the District of Columbia. The authors are willing to match this proportion of registered engineers with that of any other specialty in the engineering fraternity.

In an attempt to further solidify the professional status of sanitary engineers, the American Sanitary Engineering Intersociety Board was established in 1955, a major purpose of which is "to improve the practice, elevate the standards, and advance the cause of sanitary engineering." Registration and a basic engineering degree from an accredited institution of higher education are essential initial requirements for certification by the ASEIB. This board's additional requirements are quite high and

[1] Carl E. Lindstrom, "The Public and the Professions," *Public Relations Journal*, February, 1959. Page 22.

include proof of a minimum of eight years of professional engineering experience. Such certification, of course, is no substitute for the legal licensure requirements established by public bodies, but it does represent the attempt of this engineering speciality to promote and raise professional standards worthy of public note and approval.

Our sanitary engineers share a weak spot with other engineers in terms of professional society membership and the writing of technical articles for publication. One cannot fail to be impressed by the public activity and explanations of services rendered in which many societies are engaged—for example, the American Medical Association, the National Education Association, and the American Society of Newspaper Editors. This is not the time to go into the details of why professional societies exist. But the public has somehow come to feel, and with good reason, that "birds of a feather flock together" and "in unity there is strength;" that the "better, more competent" people openly affiliate themselves with others in their calling; that such organizations do have standards, formal or informal, which are suggested to enhance professional service to the public, and that such affiliation permits members to keep up with the latest developments in the profession. These are all valid, positive, and attractive reasons for joining. Additional reasons could be suggested but these are sufficient.

Since most sanitary engineers are graduated from civil engineering curricula, it is gratifying to note that a full fifty per cent of the 4,500 respondents in a recent national survey of sanitary engineers reported affiliation with the American Society of Civil Engineers. Some forty-four per cent were members of a "special-interest" group, namely the Federation of Sewage and Industrial Waste Associations, and forty per cent were members of the American Water Works Association. Also, almost a third of these survey respondents were members of the National Society of Professional Engineers, as compared with only fractional membership of other major engineering specialties who indicated NSPE affiliation.

Most of us fall completely flat when it comes to writing technical articles. Although a survey of technical writing by engineers stated that "most engineering executives do not consider articles and papers a regular responsibility of engineers,"[2] the industrial executives canvassed by the Los Angeles Chamber of Commerce felt that the "writing of technical papers for publication in local trade and professional periodicals should be recognized as an important part of an engineer's professional development." If these opinions sound a little like double-talk, the reactions of engineers themselves are no clearer. "Most engineers do not consider the preparation of technical articles and papers a basic phase of their professional life, although they feel responsible for keeping abreast of technical developments that are reported by others in their fields."[3] But who is left among the technically competent if no one wants to write? The attitude of "let George do it!" is not worthy of a professional engineer. Professional literature is a major part of the life blood of engineering knowledge and development. Without this literature and the ideas it brings us, we are little more than first-rate mechanics performing routine chores. If some of us are unhappy with the level of excellence of some journals, it may well be that we have but ourselves to blame, because by default we have permitted a handful of engineers who want to and can write to take over the pages issue after issue.

This identification of some of the major distinguishing characteristics of a professional person should result, hopefully, in the reader's reflection on where he stands, in terms of both absolute and relative standards of the professional engineer. He is a member of an honored group of technically trained people without whose services and talents this country would not have the pre-eminence it holds throughout the world.—**End.**

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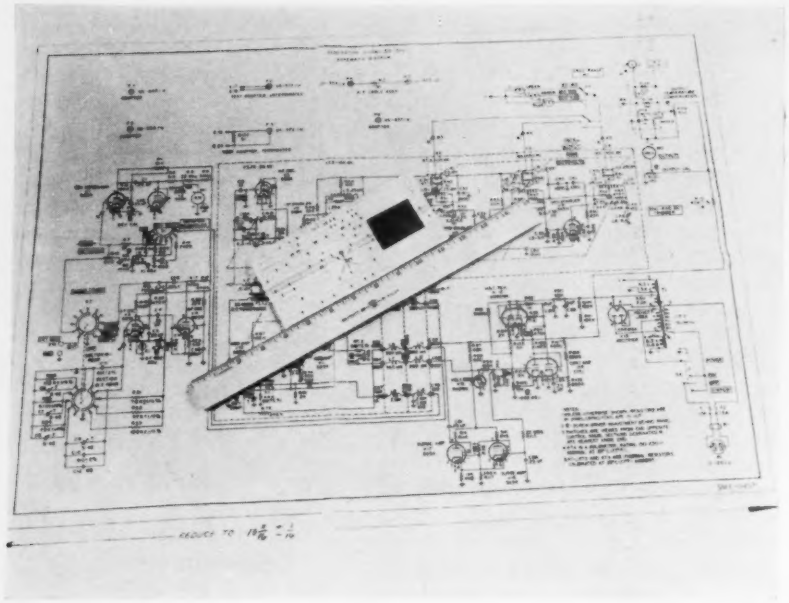
[2] Michael K. Bonner, "Technical Writing by Engineers," *Machine Design*, June 26, 1958. Page 92.

[3] *Ibid.*, page 91.

From water to wastes, the sanitary engineer must be a true professional man as the success of his job nearly always affects the public. Above: a beautifully designed tank solves a storage problem.



An example of the compactness of the microfilm system can be seen by comparing the above 22" x 34" drawing with the aperture card containing identical information. Drawings range from 8½" x 11" to 40" x 144"; larger drawings may be microfilmed in sections and mounted in adjacent aperture cards.

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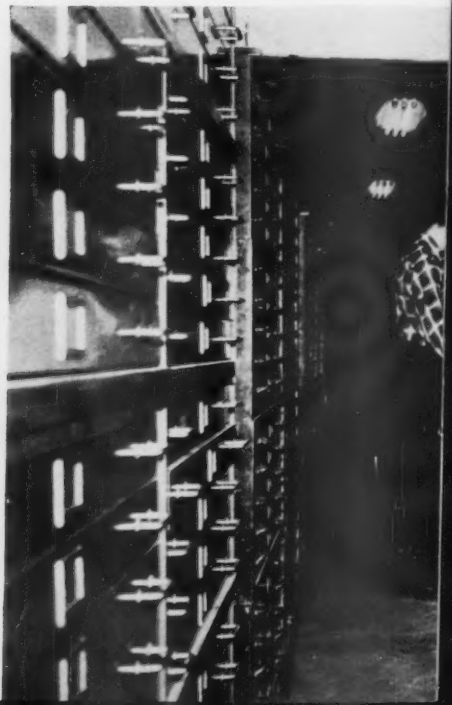
• An AE Photo Story •

Above: The operator is key-punching Signal Corps information into aperture cards.

Right: Should the engineer desire to take a printed Duplicard from the filing center to his desk or drawing board, the supplying of one is a matter of seconds with the facilities now at hand.

Shown below are a small portion of
220,000 Signal Corps drawings as the



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e 400,000 manufacturers drawings and
were formerly kept in blueprint form.

Top: Under the old filing system, it took as long as three days to locate, reproduce and deliver a full-size—22" x 34"—engineering drawing. Today, using modern facilities, any aperture card can be reproduced and delivered over the counter in ninety seconds.

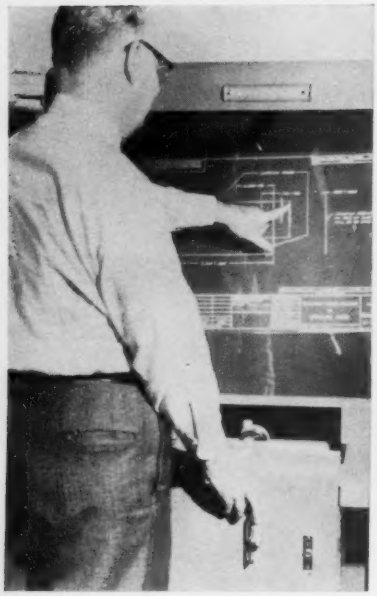
Middle: Francis R. Borden (left), microfilming project engineer, and William E. Spicer spot check aperture cards prior to world-wide distribution.

Right: After the master file of aperture cards has been created, duplicate sets or decks can be made at Signal Corps headquarters for distribution to various depots, being done here.

. . . more on next page ⟹

Above: After the microfilm roll has been approved for quality and the desired information keypunched into aperture cards, the individual frames of microfilm are mounted into the corresponding aperture cards, an operation being performed here.

Left: On arrival at Fort Monmouth, all engineering drawings are microfilmed on the base for ultimate mounting in aperture cards. Seen is a technician microfilming a Signal Corps drawing. The operator sets the equipment for proper focus and exposure in the facilities maintained at Fort Monmouth.



Speed, ease and accuracy all are resulting from the introduction of the aperture card system by the Signal Corps, as evidenced by the engineer examining a key drawing in one of the many viewers strategically placed throughout the installation.

Under the old filing system it was necessary to look in two places in order to locate one drawing from the more than 600,000 on file. Here a clerk checks a portion of the visible card index section of the old document file facilities.

Quality control is of the utmost importance to the Signal Corps. The operator above is using a densitometer to check the quality of the completed roll of microfilm before turning it over to be mounted in aperture cards.

Strictly Business

Personalities . . . **George L. Cobb** has been named works manager for the Zanesville, Ohio, plant of **Columbia Cement Corporation** . . . The appointment of **Sylvan L. Hanauer** as consulting engineer to **Morse Boulger, Inc.,** New York, N.Y., has been announced . . . **Ralph C. Smith** has been named director of plans and programs for **Lytle Corporation,** with headquarters in Albuquerque, N. Mex. . . . **Peter Rebechini** has been appointed chief engineer of **Thor Power Tool Company's** Aurora, Ill., works . . . **Ernest O. Larson** has joined the consulting engineering firm of **Berger Associates,** Harrisburg, Pa., as its chief consultant. He has been assigned to the Salt Lake City, Utah, office . . . The appointment of **Ricardo H. Vergara** as chief engineer of the **Ward LaFrance Truck Corporation,** Elmira Heights, N.Y., has been announced . . . The promotion of three of its roller chain division personnel to top engineering posts within the company has been announced by **Chain Belt Company,** Milwaukee, Wis. Appointed to chief engineer were **Raymond A. Anderson** at the Worcester, Mass., plant; **J. J. Scales** at the Springfield, Mass., plant, and **Edward A. Paul** at the Dolton, Ill., plant.

Mr. Cobb

G. Edward Trevaskis has joined **Drillunit Inc.,** Detroit, Mich., as sales manager . . . **John B. Kelley** has been appointed assistant to the executive vice president at **Burns and Roe, Inc.,** New York, N.Y. . . . **Stephen A. Fedan** has been appointed chief engineer of **Railway Express Agency,** New York, N.Y. . . . **Carlos Hidalgo** is now engaged as a consulting engineer, specializing in heating, air-conditioning, ventilating refrigerating, and general plant engineering, in Waukegan, Ill. . . . The promotion of **Dr. Hans Jordan** to the position of vice president-engineering counsel and the appointment of **A. M. Anderson** as vice president-appliance engineering for **Waste King Corporation,** Los Angeles, Calif., has been announced . . . The **Florida Railroad and Public Utilities Commission,** Tallahassee, Fla., has announced the appointment of **Henry J. Skiva** as director of its Engineering Department . . . **Alton J. Hawley** has been named vice president of **Fletcher-Thompson, Inc.,** Bridgeport, Conn.

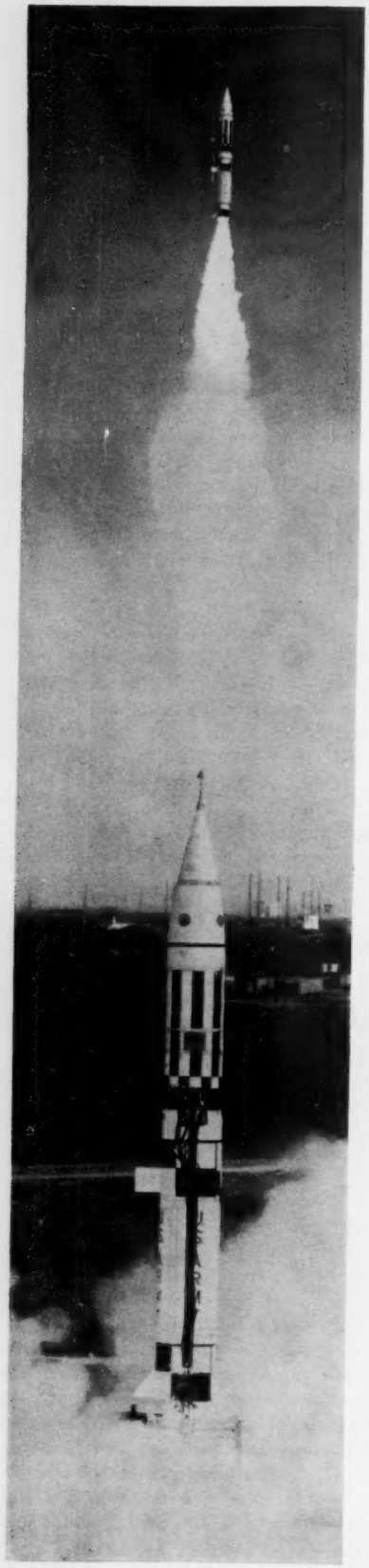
Mr. Fedan

Adolph P. Brackton, president of **Arrowhead Engineers, Inc.,** announces the opening of a New Mexico branch office in Albuquerque. The new office is headed by **Dr. Eugene Zwoyer** . . . **Dr. Howard A. Wilcox** has been named director of research and engineering in the Defense Systems Division of **General Motors Corporation,** Detroit Mich. . . . **Dr. John T. Ludwig** has been appointed to the Scientific Advisory Group of **Electronic Communications, Inc.,** St. Petersburg, Fa., as a principal engineering scientist . . . The appointment of **B. A. Vallerga** as director of products engineering for the **Golden Bear Oil Company,** Los Angeles, Calif., has been announced . . . **Frank B. Sarles,** consulting engineer, Santa Rosa, Calif., has announced the inclusion of two of his principal engineers in his practice. They are **Walter E. Brelje** and **William B. Race.** The firm now operates under the name of **Sarles, Brelje and Race** . . . **Steve J. Gadler** has been elected vice president of **Hitchcock & Estabrook, Inc.,** Minneapolis, Minn. He is a retired Air Force colonel . . . **Albert D. Sheere,** Pacific Coast division manager for **A. M. Byers Company,** has retired after more than thirty-six years of service.

Dr. Ludwig

Stone & Webster, Incorporated, New York, N.Y., has announced the appointments of **Raymond C. Foster** and **Robert H. Willis** as vice presidents of the firm . . . **James E. Wilson** has been appointed manager-special heat processing for **General Electric's** Industrial Heating Department, Shelbyville, Ind. . . . **John M. Hottenstein** has been named manager of the **Kelman Power Circuit Breaker Division,** Los Angeles, Calif., of **I-T-E Circuit Breaker Company,** Philadelphia, Pa. . . . **Charles M. Bingham** has been elected vice president of **Capitol Engineering Corporation,** Dillsburg, Pa. . . . The **CompuDyne Corporation,** Hatboro, Pa., has announced the appointment of **John Pink** as products marketing manager . . . The appointment of **Clifford Pountney, Jr.,** as research director for **The DeVilbiss Company,** Toledo, Ohio, has been announced by **D. J. Peeps,** vice president-engineering . . . **ALCO Products, Inc.,** Schenectady, N.Y., has announced the appointment of **Dr. Walter K. Stromquist** as chief of plant systems engineering in the company's Nuclear Power Engineering Department . . . The appointment of **Clifton C. Garvin, Jr.,** as general manager of its Supply Department has been announced by **Esso Standard,** a division of **Humble Oil & Refining Company.**

Mr. Hottenstein



AN ENGINEERING CAREER IN DEFENSE— GOOD OR BAD?

By

JOSEPH C. LEWIS

American Engineer Staff

EARLY last month a Bomarc B anti-bomber missile soared off the pad at Valparaiso, Florida, in what was termed the first "completely successful" and longest flight of its career as a member of the U. S. defense team.

But success may have come too late for the Bomarc. Only ten days before the Bomarc streaked its way across the Gulf of Mexico, the Defense Department announced plans to divert $300 million from the project to finance missile detector devices and long-range missiles.

The Bomarc experience is a typical example of the rapid changes which the defense industry undergoes constantly. A weapon may be emphasized today; deemphasized tomorrow. Change is simply a bittersweet fact of life with which the defense contractors and their employees must live.

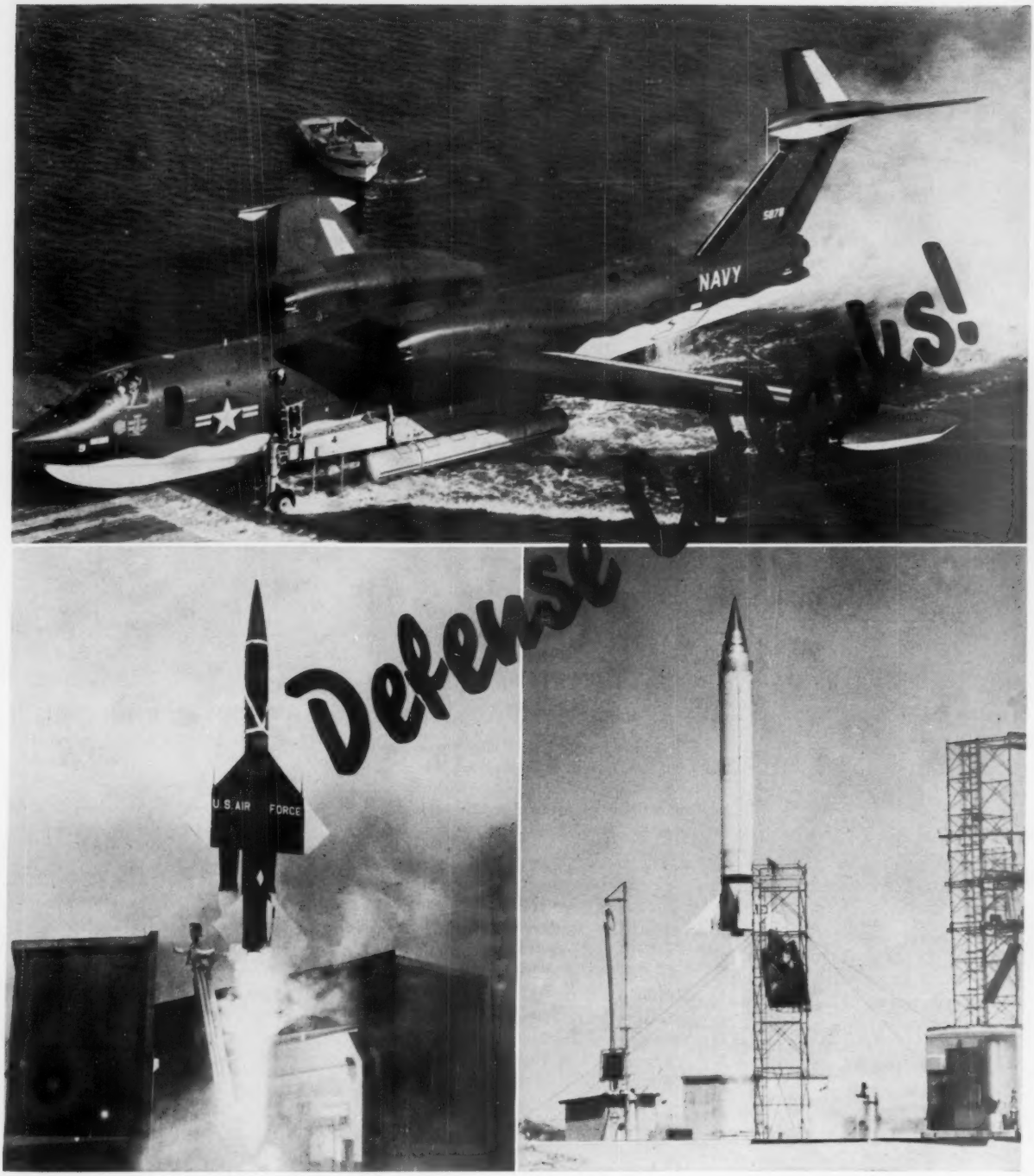
Defense today is a tremendously big business affecting a wide segment of the country's economy. The engineer—easily the most important manpower factor in defense—is particularly affected by what happens in the industry.

An Army Pershing rocket, shown here in a composite photograph, soars off the launching pad. New weapons and the demands of Space Age technology are bringing rapid changes to the defense industries, some of the nation's biggest employers of engineers.

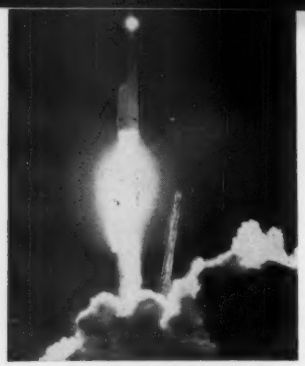
It has been the defense industry along with the Space Age discoveries that has been largely responsible for the spotlight that has been thrown on the engineering profession in recent years. It is the defense companies which flood the campuses with recruiters and fill the classified sections with appeals for the top young engineering talent.

The engineering necessities of these supersonic industries have provided the American engineer with big advantages—high salaries and enormous challenges. His obvious importance to the complex projects also has gained him high professional status in many of the companies.

In many respects, an engineering career in the defense industry is one of the most lucrative and challenging available to the profession today. Despite these advantages an often heard complaint against the defense industry is that it is too fluctuating, too dependent upon the whims of changing directions and budgets of the Defense Department. How serious a drawback this is for the average engineer in defense industries is an arguable point. Many in the industry discount it as an insignificant factor that has little effect on the engineer. Others, noting the layoffs that follow defense contract

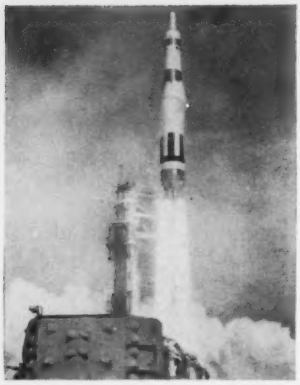


Change is an everyday word in the defense industry. Rapid changes in technology and shifts in thinking of the Defense Department require the business to be one of the most nimble-footed in American industry today. At the top is the Navy's SeaMaster Attack plane manufactured by the Martin Company of Baltimore, Maryland. The Navy decided to terminate the SeaMaster program last fall after Martin had put in nearly eight years of work on the project. Such cutbacks and cancellations are typical of the defense picture today. At the lower left is the Bomarc anti-aircraft missile from which the Air Force last month diverted funds in favor of other missile projects. In the picture at the lower right is the Viking high altitude research rocket, one of the early ventures in the rocketry field. Now more sophisticated rockets have taken the place of this early model. These rapid changes in technology make the defense industry one of the most challenging for the profession today. However, there is some fear in the engineering profession that rapid changes make the defense industry potentially instable for engineers.



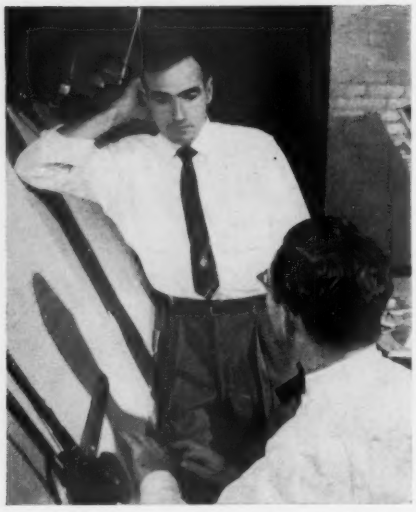
A Thor IRBM takes off.

The launching of a Matador.

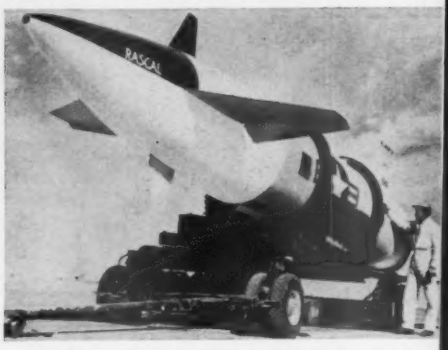


Martin's big product, the Titan.

A F-100 Super Sabre.



Engineers in defense industries have a chance to work on some of the biggest challenges of modern technology. Here Martin Company engineers discuss a new project.



A pilotless bomber developed by Bell.

cancellations, express more concern over this stability factor.

There is no question that layoffs do occur in defense industries as result of fluctuations in governmental contracts. The AMERICAN ENGINEER's survey of the 1957-1958 recession (AE, February) revealed that some of the big layoffs in industrial areas followed the loss of government contracts. And with the changing nature of the defense business, ups and downs on government contracts are certain to continue whether there is a general recession or not.

What happened to the Bomarc project is an example. Shortly after the Defense Department announced that it was diverting funds from the project, Boeing's president, William M. Allen, announced his company's employment would be reduced by 2,700 out of 10,500 direct employees on the Bomarc program. At the same time, the company said a proportionate reduction would take place among indirect help on the project "including extra engineering and administrative personnel."

The shift in the Bomarc program is just one incident. There have been dozens of others which have affected a wide variety of companies, almost all large employers of engineers. And with the rapid sophistication of weaponry it appears the changes are just beginning.

ACTUALLY the entire aircraft industry, the heart of much of the defense manufacturing, has had to undergo rapid changes in its thinking as the defense emphasis has moved from manned aircraft to missiles. And all of this had its important effects on employment and profits within these companies. Today, the weapons these companies turn out are becoming more expensive and more complicated. As this trend continues, the number of units produced becomes fewer and the volume production runs rarer.

Some of the shifts in defense spending are plainly evident in the 1961 budget. For example, the Air Force spending calls for only 663 aircraft for the year. It is definitely the missile that is grabbing the big share of the defense dollar today, and the big aircraft companies are scrambling to get their part of it.

Much of the business-getting is strictly headaches for those at the top administrative level and has little effect on engineering staffs. Many of the engineers remain on through cancellations and drastic

shifts in products, simply moving from one job to another within the company. In fact many of the changes that have taken place in defense in recent years have actually been a boon to engineers. This is particularly true in the areas of missiles, rockets and electronics where the number of engineers required is much higher than on conventional defense systems.

Many engineers and management personnel in these defense-oriented industries think the whole question of stability and security is over emphasized.

Two of the Martin Company's top engineers at its Baltimore plant—Herman Pusin and John Slattery—took essentially this line in an interview with the AMERICAN ENGINEER.

"Some young engineers looking for security are too willing to compromise anything so that they can retire at forty years," Slattery, who is the new head of the company's electronics division, commented. Pusin agrees and says he is "appalled" at some of the attitudes.

He does not, however, mean this as a blanket indictment and says there are many "good men" coming out the engineering schools today.

Pusin said he would not be in the business if it was not for the challenges of continual change in the defense industry. "Here we must always be prepared to jump one way or the other as the needs change."

Martin's experiences in recent years clearly illustrate the shift that has taken place in the aircraft industry. The company was one of the pioneers in aircraft, but today its major effort is directed toward missiles, space vehicles, electronics and research. It produces such diversified weapon systems as the Air Force's Titan ICBM, the Army's Pershing selective combat-range artillery missile, and the Navy's high accuracy Bullpup air-to-surface missile. It is also in the nuclear energy business and has established an important research arm known as RIAS.

Martin jumped into the missile and rocket field shortly after World War II and since has slowly eased out of the air frame business. Today it employs more than 7,500 engineers, 3,000 of whom are engaged in electronics development.

Defense industries face slightly different problems from those of conventional American industry as Martin's experiences reveal. George S. Trimble, an engineer who has been promoted to vice president and general manager of the Advanced Programs Group of Martin, pointed up these facts this way:

"It is important for you to realize, in making your analysis, that a business such as we conduct at Martin differs in several profound ways from the accepted pattern for American industry. For example, although we are constantly in heated competition with other aircraft, missile and electronic companies, our real competitor is Russia. We cannot obtain samples of their products to analyze and hence must assume that they are as good or better than ours. This places an extreme emphasis on the performance and suitability of our products. We cannot afford to compromise our design for any reason whatever, if such action might make our machine less than the best in the world.

"Similarly, you can see that we must embrace change in our operation. We must constantly strive to change our product to obtain improved performance as we learn

Martin Company of Baltimore is one of the pioneers in the aircraft and defense industries. Today its activities are almost solely in missiles, space, electronics and research. At the top is the early Martin MB series. At the bottom is the B-10, an old standby of the country's bomber force.

more from our research efforts. Such a philosophy is foreign to the idea of mass production of a standardized machine. . . ."

MARTIN has been highly successful in its move into the defense area, but like similar companies it has been faced with the change factor cited by Mr. Trimble. Last September, Martin received notification that the Navy's plans for the P6M SeaMaster attack seaplane had been terminated. Martin had been working on the plane since 1952.

Martin says that "some engineers" who worked on the seaplane project were released by the company, but that most were absorbed in the Denver and Orlando divisions. So, here is an example of a company that loses a big contract, but thanks to its diversification is still able to absorb the surplus engineering personnel.

Diversification has been one of the big answers to the problems arising over the shifts in the air craft companies. Lockheed Aircraft Corp., for instance, announced last year that it was going into the nuclear submarine business as well as missile ground facilities construction and military electronics. Many other firms are putting a big stake in electronics as a possible answer to decreasing aircraft profits.

Not all aircraft companies are finding the shifts into the missile and jet age so easy. Douglas Aircraft, one of the nation's bulwarks of the aircraft industry, ended last year in the red. At least part of Douglas' problems have been blamed on the phasing out of manned aircraft and the quick changes in missile technology. As a result, it is reported that Douglas has ordered pay cuts ranging from five per cent to twenty-five per cent for all of its salaried employees making more than $12,000 a year.

C. C. LaVene, staff assistant to the vice president for engineering at Douglas, says there has been a large increase in the number of scientific personnel in his company during the past five or six years and points out that key engineering personnel have been retained despite government cancellation of particular projects. He says that usually any layoffs in engineering have been of supporting personnel only.

"However, with the general shrinkage of the number of programs and the increased complexity and size of each program, this becomes more difficult to accomplish and the loss of a major program today would result in substantial layoffs," Mr. LaVene told the AMERICAN ENGINEER.

He believes the best protection the government could provide would be improved advanced military planning and longer-term funding "which would provide a better base for industry planning. Companies do need to be protected from too rapid changes in this field by more stability of programs.

"Certainly the problems affect the hiring of engineering personnel for the defense industries. Attracting capable personnel becomes more difficult with industry instability and this results in higher recruiting costs, higher salaries being offered and more supplemental benefits to offset the risk," he said.

But, there are also advantages which Mr. LaVene believes help offset the instability. "Included are the opportunities to work on advanced scientific projects and the challenge obtained by constantly pushing the state of the present art to develop items that are far from mundane. The large amount of research and development in proportion to the more routine production design prevalent in most other type industries is highly attractive," he said.

Despite the ever-present possibility of big cancellations and cutbacks, engineers have generally fared well in the defense industries in recent years. Where one company has been forced to layoff, another firm has received a new contract, opening new jobs for the engineer. Engineers are still in high demand by most defense industry, particularly engineers with specialized skills in missile and space technology.

But, this is still an era of high defense spending. In the background there are a few voices asking what happens if true peace does come to the world and weapons-making is ended. Even a reduction of something like $10 or $15 billion from the U. S. defense budget of $41 billion could cause some major readjustments.

Could a peace-time economy absorb all the engineers that are being drawn into the defense industry today?—**End.**

The Lockheed Engineering Building at Burbank, California.

Report on a Case by the Board of Ethical Review

The Board of Ethical Review was established to provide service to the membership of the NSPE by rendering impartial opinions pertaining to the interpretation of adopted Canons of Ethics and Statements of Policy regarding professional conduct. The *American Engineer* will print findings on specific cases as they are reported by the BER to the NSPE Board of Directors.

Case Number 59-2

Subject:

Termination of engineer's services and retention of different engineer for same work

Facts:

Engineer "A" had been retained by an Owner for certain engineering services under written agreement. Prior to the completion of his work, "A" was notified by the Owner that his services were being terminated. Subsequently, Engineer "B" was retained by the Owner for the same work. Engineer "B" was notified by Engineer "A" that the termination of his service was by unilateral action of the Owner and was not "accepted" by Engineer "A."

Question:

Was it ethical conduct on "B's" part to accept the contract in view of the unilateral termination of "A's" services without his consent, and over his objection?

References:

Canons of Ethics, Section 23—"He will not directly or indirectly injure the professional . . . prospects or practice of another engineer. * * *"

Section 25—"He will not try to supplant another engineer in a particular employment after becoming aware that definite steps have been taken toward the other's employment."

Rules of Professional Conduct, Rule 46—"He will not attempt to inject his services into a project at the expense of another engineer who has been active in developing it."

Discussion:

Aside from any contractual obligations which may remain between the Owner and Engineer "A" which may be settled by mutual agreement or recourse to legal proceedings, it is beyond doubt that the Owner has a right to terminate the services of the Engineer at his pleasure. Section 8 of the Canons makes it clear that the Engineer acts as an agent or trustee for the Owner and, as such, serves at the sole discretion of the Owner. Even should the Owner's decision be based on whim, caprice and other unsound motivation, it does not alter his right to have the Engineer of his choice for the work. It is equally clear, of course, that the Engineer is entitled to proper compensation for the work he performed.

In the absence of any showing that Engineer "B" had any part whatsoever in the Owner's decision to terminate the services of Engineer "A" in order to secure the assignment for himself, or for other motives, there is no violation of ethical principles in his acceptance of the same work. To hold otherwise would amount to stating that the Owner would not be allowed to secure competent engineering services if he became dissatisfied with the services of the Engineer originally selected for the work.

Conclusion:

Engineer "B" may ethically accept and perform the work for the Owner, subject to the assumption that he was in no degree responsible for or a party to the Owner's decision to terminate Engineer "A's" services.

Approved by the following members of the Board of Ethical Review at their meeting in Washington, D. C., December 10, 1959.

L. R. Durkee, P. E.
Phil T. Elliott, P. E.
Pierce G. Ellis, P. E.
Ezra K. Nicholson, P. E.
Murray A. Wilson, P. E., Chairman.

Dissenting Opinion:

The majority opinion is as follows: "Engineer 'B' may ethically accept and perform the work for the Owner, subject to the assumption that he was in no degree responsible for, or a party to, the Owner's decision to terminate Engineer 'A's' services."

Section 8 of the Canons referred to in the discussion of the majority opinion is as follows: "The engineer will act in professional matters for each client or employer as a faithful agent or trustee."

The case was submitted to the Board of Ethical Review as a hypothetical situation. It is agreed that this is the proper procedure. It is pertinent here, however, to point out that the case as submitted to the Board grew out of an actual situation and set of circumstances. Engineer "A" in the actual case stated that other engineers declined the employment which "B" accepted.

The majority apparently based its conclusion upon two prime considerations, to wit: (1) the contract with Engineer "A" had been terminated by the Owner, and (2) Engineer "B" was in no way responsible for or a party to the Owner's decision to terminate Engineer "A's" services.

The majority in its discussion says "Even should the Owner's decision be based on whim, caprice and other unsound motivation, it does not alter his right to have the Engineer of his choice for the work." A transaction involving professional services may be entirely legal and at the same time it can be unethical for a professional engineer to be a party to the transaction. It was not enough for Engineer "B" to have satisfied himself that the Owner had terminated the contract. As a professional engineer, "B" should have ascertained the circumstances surrounding the dismissal of Engineer "A." If in fact the contract was terminated by the Owner based on whim, caprice or other unsound motivation, Engineer "B" was on "swampy ethical ground" in accepting the assignment. It could reasonably be assumed that the other engineers who declined the employment in the actual case made such an investigation.

There is no showing of any kind that Engineer "A" failed to act in any way other than as a "faithful agent or trustee." (Canons, Section 8)

This is an important case but it has been oversimplified in the Statement of Facts. The majority apparently considered the contract as a routine business trans-

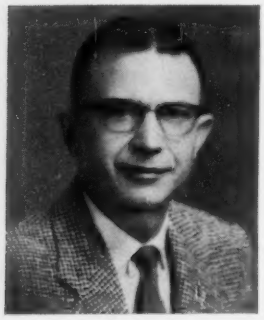
(Continued on page 56)

Unique Experiences in Engineering . . .

SLIDERULE MAN IN MYSTIC INDIA

WHAT W. W. Zook learned in 1952 about designing an irrigation system isn't found in college textbooks.

Mr. Zook, P. E., a consulting electrical engineer with headquarters in Wichita, Kansas, picked up his unique experiences on a Point-



Mr. Zook

Four financed project for the Indian government.

The experiences included everything from a night in an elephant barn to a lengthy bout with an Asian version of hepatitus. And to add an ironic note, the irrigation system over which Mr. Zook struggled has yet to be built by the Indian government.

Mr. Zook became involved in the project back in May of 1952 when he received a hurried up call asking him to fly to India to secure a contract for the design and construction of 4,000 miles of electrical distribution lines and fifty-five small electrical power plants to be used in the irrigation system. The trip was to be a quick two-week affair.

This sounded fine to the Wichita engineer. But, as Mr. Zook soon learned, the project wasn't quite as simple as it appeared on paper back in the States. The two-week trip became a long six months of frustrating, but usually highly interesting, experiences.

This, in Mr. Zook's words, is the situation he faced when he arrived in India:

"The government of India had received a U. S. Point Four allocation of $20 million to install 2,000 irrigation water wells in the Ganges River Valley, covering an area roughly 700 miles north and south by 200 miles east and west. A geological survey had been completed some two years before showing 500 to 700 gallons per minute could be developed over most of the area. The father of the president of our associate firm had donated the survey to the Indian government.

"Lacking any electrical power supply over most of the entire area (many villages had small DC electrical systems for small industries, street lighting, a few business establishments and fewer homes), the project was to include providing electrical power supply and distribution systems as well as locating, drilling and completing the water wells. Our associate firm was to act as primary contractor to the government and construct or drill the wells complete with pump house; our firm was to get electrical power to the wells."

Designing such a system in the U. S. probably would not be too difficult for the average American engineering firm. But this was India of 1952, a nation with new independence where electricity and many other 20th Century conveniencies were still luxuries. Mr. Zook and the other foreign engineers who came to India back in these early Point Four days, were some of the pioneers in the country's development.

These engineers had few guideposts to go by; they had to improvise their own methods and standards. There were no finely-tailored government regulations and specifications to assist them.

"A small book about five by seven inches and less than an eighth of an inch thick constituted the only government rules for electrical distribution system construction, and I could find none for power plants," Mr. Zook recalls. "The only reference as to minimum ground clearance for electrical conductors was that they were to be higher than an elephant."

Many of the Twentieth Century conveniences which the U. S. takes for granted were still lacking when Point Four engineers came to India after World War II.

His firm was only one of eighty-nine companies that were in New Delhi in the summer of 1952 seeking the contract from the Indian government. When Mr. Zook arrived he faced a quick deadline for completion of the design specifications, and, at the same time, stiff competition from top engineers throughout the world.

"While talking with numerous people my first two days, it seemed that most of the other firms were working on a basis of using their own countries construction standards," he said. "I decided to reverse the field and use the construction methods the people of India were used to, in other words, their own methods.

"This was not easy, but I simply looked at samples, checked the math of their design and copied it, and stretched it to fit my own idiosyncrasy of design."

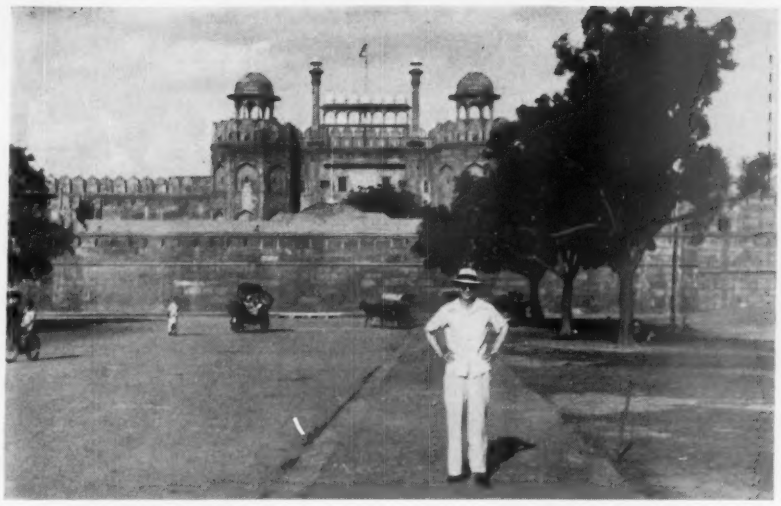
In one example of Yankee ingenuity, the Wichita engineer came up with an idea to use reject railroad rails, some back to back, for distribution poles.

But, finding the answers to the design problems was only half of the battle, as Mr. Zook soon discovered. Negotiations over the contract dragged on and on for months with the Indian government. Despite this rather frustrating experience, he has kind words for the new Indian government.

"Although the government of India was less than two years old as an operating organization and naturally to me, most, if not all, of their customs, methods and procedures were literally 'out of this world,' I have never dealt with a more courteous group. And as I became more acquainted I found their system was not any more 'fouled up' than ours."

While all of the negotiations were going on, Mr. Zook found time to become truly acquainted with some of the back roads of India. Here's the way he describes these side trips:

"I increased my methods of transportation to include river steamers and some really fantastic railroad accommodations. I slept in an elephant barn, got lost on a railroad system and ended up in Nepal, a country for which I had no visa. Once I ran out of food and water and lived two and one half days on a rationed diet of brandy. In short I became sort of acclimated."

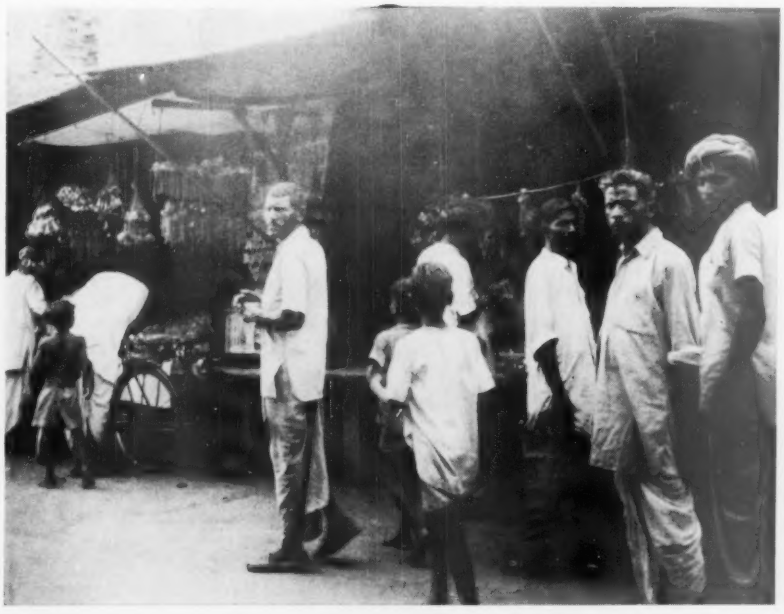


W. W. Zook, of Wichita, Kansas, got a good look at India while designing power plants and distribution systems for irrigation in 1952. Here he stands in front of the Red Fort of New Delhi.

After seven weeks, Mr. Zook was finally informed that his firm's proposal had been accepted, but there were still more negotiations to come. In October—six months after starting what was to have been a two weeks' trip—he received written confirmation of acceptance. However, today, most of the irrigation system still remains to be built by the Indian government.

Mr. Zook admits his experiences in India were highly interesting, but says he was very glad to get back to the States. However, he found that part of India came with him. As he was being cleared by customs at Idlewild Airport in New York, he became ill with what was diagnosed as an Asian version of hepatitus. He spent twelve weeks in the hospital before returning to his normal life as a Midwestern electrical engineer.—**End.**

India was less than two years old as an independent nation when Mr. Zook arrived there in 1952. These groups of refugees are from the area that later became Pakistan.



Engineers Face a Nation-Wide Problem in—

HIGHWAY LIGHTING

By
W. E. SCHWANHAUSSER
Manager, Application Engineering,
Outdoor Lighting Department,
General Electric Company

THIS is a nation on wheels. And yet, today, many of our streets and highways are jammed to—and sometimes beyond—capacity. Many cities are fighting for their very existence due in no small part to the automotive congestion that is choking them to death.

New highways are being designed and built to handle traffic more effectively. Likewise, cities are improving their existing street systems in an effort to improve the flow of traffic and preserve the heart of the city and its large investments. A city, like a business, cannot afford to lose its sources of income without getting into difficulty.

It is during the after dark hours —with only one third of the total traffic volume on the road—that more than half of the motor vehicle fatalities occur. The over-all national rate of night to day fatalities shows it is three times as dangerous to drive after dark as during daylight hours. Both directly and indirectly the lack of light causes the unfavorable ratio of both injuries and fatalities at night.

Perhaps the first thought that comes to mind in providing street lighting is "Main Street." Chicago's State Street recently regained its title as the "World's Best Lighted Street" with the installation of a concentration of fluorescent luminaires which provide a fifteen footcandle level of illumination.

Indications are that this new lighting is helping to attract people at night and helping preserve the economy of downtown Chicago and the city as a whole.

How long State Street will be the world's brightest is problematical for there are other "prestige streets" in America where similar upgradings are under consideration. Titleholder before State Street was 69th Street in Upper Darby, Pa.—a Philadelphia suburb where a 1000 watt mercury vapor lighting system turns night into day at an eight-plus footcandle average level. This new lighting system provides ten times the illumination previously supplied by less efficient filament lamps but with only a fifty per cent increase in energy consumption.

It was only a decade ago that Kankakee, Ill., came up with a then startling five footcandle installation. The Upper Darby lighting almost doubles this and State Street almost triples it. Lighting levels continue going up as lamp and luminaire technology continue to advance and make these higher levels more practical and feasible.

Away from "Main Street" on traffic streets or arteries, vehicle speeds increase and traffic accidents can happen before the driver can see to avoid them—unless there is good lighting at night.

The American Standards Association practice calls for only about one footcandle or so for safety's sake on these arterial streets, yet less than an estimated twenty per cent of this type of America's streets meet these minimum standards for safe night driving. Some of the outstanding examples of streets that do come up to standard are Bayshore Boulevard in Tampa, Fla., 38th Street in Indianapolis and several heavily traveled streets in Denver, Col. The Tampa and Denver installations use 400 watt mercury vapor lighting while four lamp fluorescent luminaires provide proper illumination on the Indianapolis thoroughfare.

These are some of the cities that met the challenge on arterial

streets. But this is perhaps the most fertile ground yet for "converts" to proper lighting.

According to the American Automobile Association, pedestrian accidents are directly related to the hours of darkness. The night fatality curve follows the number of hours of darkness. As much as this country travels on wheels, drivers become pedestrians when they park their cars. So it concerns even drivers to be aware that lighted streets cut down the number of pedestrian fatalities.

Many cities have relighted their main thoroughfares with almost legendary results. These include Dayton, Cleveland, Baton Rouge, Gary, Hartford, and Kansas City. In Detroit the night to day fatality rate for pedestrains dropped from seven to one to only 1.4 to one after the installation of modern street lighting.

Not only do fatalities decrease but the accident severity is also reduced when motorists are provided with the light to see. Given a chance to size up a situation the motorist is afforded the opportunity to react quickly and correctly. No time is wasted guessing, if the street is properly lighted.

All too often another thieving murderer is present on our streets —the antiquated lighting fixture that costs as much to operate as a modern luminaire but fails to throw the light on the street where it is most needed to prevent accidents. Post top and "tin pie-plate" luminaires are robbers of the taxpayers' funds just as surely as an embezzling town clerk. These fixtures are as dated and effective as the Model "T". Many communities have modern roads lighted with Model T lighting.

One community that did something about out-dated lighting fixtures was Brookings, S. Dak. This progressive community of 8,000 citizens ripped down every old-fashioned street light that splattered little puddles of light here and there about town and installed more than 1200 modern fluorescent luminaires. Brookings became the first all-fluorescent lighted community in America and every street in town is lighted to code levels.

How much does good, well planned street lighting cost? The average budget for street lighting is about $1.50 per capita. For an extra $1.50 to $2.50—the price of a week's supply of cigarettes—the average city can have safe, pleasant streets from city limit to city limit.

Street lighting is paid for whether it's there or not. Proof of indirect payment for traffic deaths shows up in savings in insurance premiums for residents of Iowa. Here citizens effected a nine per cent reduction in premiums—about $16 million in all—after a reduction by ninety-five of traffic deaths in 1958.

The federal interstate highway system is beginning to link cities and even states although it is still a long way from completion of its proposed 41,000 miles. These roads are being designed for travel in 1975. Yet, they will be obsolete before completion unless provision is made for adequate lighting.

One example of a modern expressway or highway with proper illumination is the Calumet Skyway into Chicago from Indiana—and the last link of toll roads running from New York to the Windy City. Total cost was $101 million with the installed cost of lighting only a small fraction of this. It would have been almost criminal to have left lighting off. With limited shoulder space it is imperative that lighting be provided to reveal any disabled motorist or other trouble well in advance to avoid collisions and maintain the capacity of the roadway.

Of course, only the heavily traveled stretches of superhighways or expressways have to be lighted every foot of the way. There are, however, seven critical areas of driver decision where proper lighting should be provided to cut down accidents. Besides the heavily-traveled stretches in urban areas, these are interchanges, exits and entrances, bridges and viaducts, tunnels and underpasses, guide sign locations, and intersections.

And experimentation is still going on. On the Manahawkin, N. J., Causeway Bridge, fluorescent luminaires mounted in the bridge's railing just fifty inches above the roadway surface provide illumination at right angles to traffic. According to the New Jersey Highway Department tests, this means greater effectiveness in fog, snow, and rain and a reduction in glare at all times.

Just what the future will bring no one can say with certainty. Perhaps a new and better light source will appear. Undoubtedly, technology will continue to get better. But, by planning ahead and meeting tomorrow's challenges today, tomorrow's driver will find his road easier to travel and America will be a safer place in which to work and play after dark.—End.

Winston-Salem, N. C. . . . ***Chicago's "State Street" . . .*** ***Fort Wayne, Ind. . . .***

New Literature

BEARINGS—A new booklet, "Alcoa Bearings," is now available. The concise title is borne by Aluminum Company of America's latest and most extensive collection of case histories, engineering, and test data pertaining to sleeve bearings and bushings of the light metal. According to the 90-page study, aluminum has been fashioned into bushings (single piece hollow cylinders) ranging in size from pieces no larger than a fingertip—to gigantic 4-foot diameter units weighing ¾ ton, and built to support loads of more than 5-million pounds. The art and science of designing these particular parts—and the majority which fall between these dimensional extremes—is discussed fully in the booklet. Ten case histories, detailing both common and exceptional applications, preface two large sections of engineering and test data. The latter presentations aid designers in specifying aluminum bearings (two half shells, or several segments) and bushings in many areas once considered not feasible for the bright metal. Liberal use of charts, graphs, drawings, and photographs in the technical discussion aid the designer by presenting data gained from Alcoa's extensive experience with light metal bearings and bushings.

(Circle 15 in Readers' Service Dept.)

PRODUCTS—A 12-page brochure titled "Dependable Quality in Quantity" which covers Motorola's complete line of industrial semiconductor products is now available from Motorola's Semi-conductor Products Division. The brochure lists major specifications such as breakdown voltages, current capacity and operating temperature range on each of Motorola's products. Motorola currently has five complete lines of industrial semiconductors including germanium industrial power transistors, audio and switching transistors, Motorola Mesa transistors, silicon rectifiers and silicon zener diodes. Also contained in the brochure is information concerning the Motorola "Meg-A-Life" reliability program in which industrial semiconductors are subjected to electrical, mechanical, environmental and life tests identical to those required for military specifications and are available to commercial users.

(Circle 16 in Readers' Service Dept.)

SILICONES—An up-to-the-minute summary of the forms, properties and applications of Dow Corning Silicones is contained in a 16-page brochure. Silicone products reviewed range from adhesives to release agents, laminating resins to rubber compounds, and electrical insulation to water repellents. The table of contents is arranged according to applications enabling quick, easy reference to silicone materials that resist the effects of time, heat, moisture, weathering, oxidation, and chemical attack . . . properties of vital interest to design engineers and production-maintenance men. Pre-addressed business reply postcards are bound into the guide to facilitate reader inquiries for more specific data about a particular product or application.

(Circle 17 in Readers' Service Dept.)

WATER HEATER—"Hot Water for Industrial Plants," a 100-page manual, Number CH-110, is now available to installers of hot water heater installations for industrial applications. The manual provides detailed information of hot water applications for industrial processes, laboratories, cafeterias and dining rooms, lavatories, wash fountains, showers and other industrial hot water uses. Complete, in the new manual, are sizing charts, specifications and diagrams, installation data and diagrams, and a comparative fuel cost chart for commercial water heating.

(Circle 18 in Readers' Service Dept.)

SCHOLARSHIPS—A 12-page brochure is now being offered which reveals details of the Hertz Engineering Scholarship Foundation, a nonprofit private institution devoted exclusively to the granting of engineering scholarships to students interested in electrical, mechanical and allied engineering fields. The brochure compares many of the basic principles of the United States and Russian technical education systems, and explains the reasons behind rapid development of the Soviets in this field. It also discusses the decreasing number of our high school graduates who go on to an engineering education, as well as the 100,000 high school graduates yearly that fail to go on to college because they lack the funds to do so. Finally, the brochure explains how American industry and individuals can help alleviate the shortage and waste of scientific and engineering capabilities in the United States, through the channeling of tax deductible funds into sponsored scholarships administered by organizations such as the Hertz Foundation, which is exclusively oriented toward the granting of engineering scholarships.

(Circle 19 in Readers' Service Dept.)

STRAINERS—An 88-page handbook of simplified selection and sizing of industrial and marine strainers has been published by Tate Engineering, Inc. The Tate Strainer Guide contains a compilation of reference data for the layout of fluid flow systems and sizing of strainers, tabulated results of testings in its own research facilities, and valve and pipe selection information. Reference material for each strainer section is on a foldout page for easy use with any specific page in that section. The guide contains over 100 illustrations of pressure drop, temperature, and viscosity charts made from actual testings in addition to engineer drawings of the full range of strainers. Information is arranged for simplified use by purchasing agents and yet includes all the technical data necessary to the engineer for layout of fluid flow systems. The complete line of Tate strainers is illustrated with dimension specifications. Also included are the new Tate multi-basket strainers in both simplex and duplex design.

(Circle 20 in Readers' Service Dept.)

SURVEYING—An illustrated brochure describing the principles of precise distance measurement with microwaves is now available. General explanation of Tellurometer System for determining length of lines 500 feet to forty miles in length, and practical applications for highway, pipeline and transmission line traverse, for trilateration and for offshore positioning of oil rigs, construction projects, and dredges are described.

(Circle 21 in Readers' Service Dept.)

FACILITIES—Facilities for research and development and for production of laminated plastic and vulcanized fibre, as well as for fabrication of the versatile engineering materials into finished parts, are illustrated and briefly described in a 12-page bulletin published by Taylor Fibre Company. Included are thumbnail descriptions of what laminated plastics and vulcanized fibres are and how they are made. Simple sequence drawings show how each material is made. Particular attention is given to Taylor Fibre's newly-created Advanced Materials Division to research and develop Taylorite vulcanized fibre and Tayloron laminated plastics for applications in today's advanced technologies involving products such as rockets, missiles, jet aircraft, and nuclear reactors.

(Circle 22 in Readers' Service Dept.)

ALUMINUM—A technical brochure, describing primary and mill products produced by Harvey Aluminum, has just been published. The 12-page booklet reviews the full range of shapes, sizes, and alloys available in primary aluminum pig, ingot, and billet and in wrought aluminum mill products. Complete metallurgical tables and helpful design information make the brochure a significant reference for designers, engineers, purchasing agents, production men, and metallurgists. Light and heavy press extrusions, press forgings, hand forgings, impact extrusions, pipe, tubing, and other commodities made by the integrated company are listed. Product applications, alloy characteristics, and production facilities also are included.

(Circle 23 in Readers' Service Dept.)

SPECIFICATIONS—The 1960 edition of the RLM standard specifications book for industrial lighting units includes three new specifications for

1500ma units; D-4 fluorescent semi-direct medium high mounting, SD-3AL semi-direct aluminum and SD-3PE semi-direct porcelain enamel units. In addition, the new 52-page book contains many upward revisions of existing specifications, including new high specifications for materials; new specifications for aluminum reflectors and added provisions for inspection and testing. All RLM fluorescent specifications now include, where applicable: 1—Grounding of all component parts; 2—Continuity of grounding throughout a continuous row; 3—Silver plated contacts in all "rapid start" units, and 4—Synthetic enamel specifications for component parts covering rust inhibiting undercoating, adhesion and hardness.

(Circle 24 in Readers' Service Dept.)

DIRECTORY—Allied Radio Corporation announces publication of an expanded sixth edition of the Allied Semiconductor Directory. This complete purchasing directory includes the newest power, high-speed switching, high-current, zener and diffused junction mesa type transistors. Also listed are the latest micro-diodes, voltage-variable capacitors and photo-sensitive devices. This 16-page comprehensive directory and buyer's pricing guide to transistors, diodes and rectifiers covers semiconductors of eighteen major American manufacturers. Two companies appearing for the first time in the directory are Minneapolis-Honeywell and Rheem Manufacturing Company.

(Circle 25 in Readers' Service Dept.)

X-RAYS—A 4-page folder titled "Atomic Uses of X-ray Techniques," is available from Philips Electronic Instruments. The text describes work with X-ray diffraction, diffractometer and spectrograph techniques on uranium-aluminum alloys, lattice parameter determinations in studies of the amount of alloy or solid solution, temperature effects on atomic spacing, and oxygen effects on zirconium. The pamphlet also deals with phase identification in beryllium and similar metals at high temperatures, texture work on zirconium, uranium and beryllium. X-ray diffraction work is described in connection with identification of phases, compounds and products of reaction.

(Circle 26 in Readers' Service Dept.)

MOISTURE—Soiltest, Inc., has issued a new bulletin on the Nuclear-Chicago d/M Gauge for surface moisture and density measurements of soils and similar materials. The new nuclear devices are designed for use by engineers, agronomists, scientists, and contractors. The bulletin gives complete specifications for the instruments and photos show their correct use for both moisture and density tests in conjunction with soil compaction work.

(Circle 27 in Readers' Service Dept.)

AIR POLLUTION—Ways to lick one of the toughest air pollution problems in industry are presented in a new 12-page bulletin entitled, "Special Report: Freedom from Hot, Corrosive Dust with Glass-Bag Filters," and published by Dracco Division of Fuller Company. Bulletin No. 806 presents illustrated application data which describes how Dracco Glass-Bag Filters provide top efficiency in cleaning hot, corrosive gasses in three plants representative of the cement and metallurgical industries. Temperature of gases filtered in one of the described installations reaches 550°F., just 50° under the maximum temperature capacity of the filters. In another installation temperature reaches 450°F. Another section of the bulletin deals with methods of cleaning glass fabric bags.

(Circle 28 in Readers' Service Dept.)

These listings are informational only and are not an endorsement of the products, nor of the manufacturer's claims. To receive any of the new literature described in these columns, merely circle the item number in the Readers' Service Dept. and mail to AMERICAN ENGINEER.

Official Program Announced For NSPE Meeting, June 8-11

• Kentucky, New Hampshire to Petition

• Keating to Speak at Closing Banquet

NSPE members attending the annual meeting in Boston, June 8-11, will participate in what promises to be one of the most significant sessions ever held by the National Society.

Among the many highlights on the program are:

• Presentation of the NSPE Award to James F. Fairman, senior vice president, Consolidated Edison Company of New York.

• Petitions for affiliation by engineering groups from the States of Kentucky and New Hampshire, the only remaining States not affiliated with NSPE.

• Results of the "Unity Questionnaire" on the organization of the engineering profession.

• Speeches by Dr. Hugh L. Dryden, Senator Kenneth B. Keating of New York, and Admiral Arleigh Burke.

• The first annual NSPE Industrial Professional Development Award to the Phillips Petroleum Company.

In addition to these features, the four-day meeting at the Hotel Statler Hilton will include functional section get-togethers for the engineer in private practice and government, an impressive industry-education program (see page 47), special panel discussions, plus the regular professional meetings.

The selection of Phillips Petroleum to receive the Industrial Professional Development Award was recently made by a special Award Committee (see story, page 18). Paul Endacott, president of Phillips, will accept the Award at a luncheon on June 11. He is scheduled to speak on "Incentives for Professional Excellence."

Another top speaker, just announced, is Senator Kenneth B. Keating who will discuss "The Engineer's Role in Politics" at the Saturday night banquet.

Admiral Burke will talk at a dinner on June 9, while Dr. Dryden will speak at the Friday luncheon, June 10.

Following welcoming remarks at the opening session by Walter J. Kreske, president of the host Massachusetts Society, NSPE members will be given an official greeting by John A. Collins, Mayor of Boston.

Also on the Boston program will be a preliminary report on a survey made by the Professional Engineers Conference Board for Industry concerning engineering professionalism in industry. The Conference Board, through a series of depth interviews with engineers and executives in industry, has studied the factors involved in professional development from both the engineering and management viewpoints. The published study, being made for the Conference Board by the Opinion Research Corporation, will be the sixth in a continuing series of executive research reports dealing with engineers in industry.

A "State of the Society" address will be given by NSPE President Harold A. Mosher on the evening of June 8.

Here's the program:

TUESDAY, JUNE 7, 1960

9:00 a.m.—5:00 p.m. Executive Committee Meeting

WEDNESDAY, JUNE 8, 1960

9:00 a.m. Executive Committee Meeting
9:30 a.m. Registration Opens
11:00 a.m. Exhibits Officially Open
5:00 p.m. Cocktail Party
6:00 p.m. Buffet Dinner

"NSPE Ambassadors Special Report on South America"
Presentation: Dr. Beatrice Hicks, P.E. Rodney Chipp, P.E.
Formal Opening of Professional Meeting

8:30 p.m. For those not attending the NSPE Professional Meeting — Boston

(Continued on page 52)

Minute Man

The statue of the Minute Man at Concord—famous scene of "The first shot that was heard 'round the world."

Old State House

The Old State House—here the first Town House was built in 1657 in the earliest market place of Boston. The present building was built in 1713, burned in 1747, and immediately rebuilt with walls of the former building.

PRIVATE PRACTICE PROGRAM

FRIDAY, JUNE 10, 1960

9:30 a.m. Welcoming Remarks: Alfred H. Samborn, P.E., Chairman, Functional Section for Consulting Engineers in Private Practice

Review of Functional Section Activities of Past Year
- Executive Committee—Alfred H. Samborn, P.E.
- State Society Functional Section Programs—Regional Vice Chairmen
- Practices Committee—Frank Sanford, P.E.
- Government Contract Relations Committee—L. M. Van Doren, P.E.
- Liability Insurance Committee—Arlow Ferry, P.E.

Report of Nominating Committee—L. M. Gates, P.E.
Additional Nominations
Election of Officers
Questions and Discussions on Committee Reports and Section Activities

2:30 p.m. Afternoon Session

Speaker: Hon. Gordon H. Scherer of Ohio
Ranking Republican Member, House Roads Subcommittee, Committee on Public Works, and Member of the Special Subcommittee to Investigate the Federal-Aid Highway Program
Speaker: Arthur W. Lewis, Esq., Special Counsel to the New Jersey Society of Professional Engineers
"Report on Pending Litigation on Jurisdiction Between Architects and Engineers"
Following these presentations, there will be open discussion and questions from the floor

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GOVERNMENT PROGRAM

FRIDAY, JUNE 10, 1960

9:00 a.m. Morning Session

THE CURRENT STATUS OF THE PROFESSIONAL ENGINEER IN GOVERNMENT

Moderator: Wesley E. Gilbertson, P.E., Chairman, Functional Section for Engineers in Government
The Government's Need for Professional Engineers
Richard J. Healey, Director, Region 1, U.S. Civil Service Commission, Boston, Massachusetts
The Engineering Profession in the State Highway Department
William R. B. Froehlich, P.E., Chief Deputy Secretary, Pennsylvania Department of Highways
Professional Problems Facing The Engineer in Uniform
Brig. General Robert B. Warren, P.E., Assistant Chief of Engineers for Troop Operations, Corps of Engineers, U.S. Army
Engineering Manpower Problems in Local Government
(Speaker to be announced)

2:30 p.m. Afternoon Session

Annual meeting of the Functional Section for Engineers in Government
Election of Officers for 1960-1961
Status Reports on Functional Section Activities
State and Municipal Merit System and Engineering Personnel Policies Survey
Gordon Bodien, P.E., City Engineer, City of Minneapolis, Minnesota
Federal Legislation
Stanley H. Stearman, Assistant Legislative Counsel, NSPE Staff
Other Programs and Activities
Wesley E. Gilbertson, P.E., Chairman, Functional Section for Engineers in Government Practice
Brief Reports on Activities of State Government Functional Sections:
Connecticut, District of Columbia, New York, Rhode Island
Questions and Floor Discussion

INDUSTRY-EDUCATION PROGRAM

FRIDAY, JUNE 10, 1960

9:00 a.m. THE MEANING OF PROFESSIONALISM IN INDUSTRY

Moderator: H. P. Cooper, P.E.
Chairman, Engineers-in-Industry Subcommittee
Presentation of Sixth Executive Research Survey of the Professional Engineers Conference Board for Industry by—
Hugh L. Rusch, Vice President
Opinion Research Corp., Princeton, New Jersey
Following this original presentation, there will be analysis and discussion of the survey and its ramifications by outstanding leaders in this area, including:
Charles F. Savage, P.E., Consultant-Engineering Professional Relations, General Electric Company, New York City
Raymond F. Fremed, Associate Editor
Chemical Engineering, New York City
William G. Duvall, Assistant Personnel Director
Western Electric Co., New York City
Harry Krieger, Jr., Administrator of Engineering Personnel Relations
Radio Corporation of America, Camden, New Jersey

2:30 p.m. HUMANITIES—THE 'MUST' DIMENSION IN ENGINEERING

Moderator: Dr. Albert Haertlein, Associate Dean, Division of Engineering and Applied Physics
Harvard University
A stimulating discussion by outstanding leaders on how professionalism can be inculcated in engineering students so as to meet the demands of today and tomorrow. Among the areas to be explored will be "Methods of Inculcating Professionalism for Application in Industry."
John Gammell, Director of Graduate Training
Allis-Chalmers Manufacturing Co., Milwaukee, Wisconsin
William T. Alexander, Dean, College of Engineering,
Northeastern University
Arthur E. Bryson, Jr., Associate Professor in Mechanical Engineering,
Harvard University
Edward Barry, P.E., Past Member, Massachusetts State Board of Registration

Thoughts on Professionalism...

Professional Concepts in Students

PAUL H. ROBBINS, P.E.
NSPE Executive Director

DURING the State Presidents' Conference at Purdue last month there was much discussion on the general topic of professional consciousness among engineers. It ranged from the difficulties members have in interesting nonmembers in working on professional concerns to attitudes of engineers in industry, government, and other areas toward their professional development, the personnel policies, and other matters which create the climate in which they work.

FREQUENTLY, the presidents would comment that there is need for a greater awareness of professional concepts among engineering students, that this should not be left solely to experience attained after graduation, and that young men need philosophies which will put their subsequent work experience into perspective.

IT WAS interesting to note some of the activities reported by presidents as being accomplished toward this end. In one state having several engineering schools, the state society has sponsored a meeting of the deans of all the engineering schools in the state to discuss what assistance the state society can give in developing greater professional consciousness on each campus.

IN ANOTHER state the state society provides speakers for a course for all seniors. At one of our engineering colleges, a professor who is a past president of the state society teaches a course using as text material a number of NSPE publications. In still another institution there is at least one convocation a year at which all engineering students, freshmen through seniors, are required to be present, which is addressed by a national engineering leader secured by the state society. It was further reported that at several schools, and in a soon to be released national study, there is increased recognition and attention to specific emphasis on professional concepts.

OF COURSE, greatest discussion centered on the opportunity presented for such emphasis through student chapters of the professional society. Not only does this provide a continuing emphasis on this important phase of the individual's development, but it continues throughout his college career. It gives the student an opportunity to discuss the facets of professionalism most vital to him. Through his activities in the chapter he can search, with others similarly interested, as deeply into a subject as he wishes. It makes available to him all the literature of NSPE and the state society. And it, of course, keeps him abreast of professional developments through his monthly issues of the AMERICAN ENGINEER and the state publication.

WHILE it was heartening to note the things that are being done and the developing concern for this area of student instruction, it was disturbing that the general development of organized efforts in this area was, at best, spotty. If we are to improve the concern of all engineers of the future for the status and stature of the profession, much more attention to inculcating professional concepts among students must be given to this by faculty and state societies.

Otto H. Hall Dies; Former NSPE Director

Otto H. Hall, of Lakewood, Colorado, a former NSPE national director, died of a heart attack in March. He was Colorado's director of public works.

Mr. Hall, 55, was employed for

Otto H. Hall

many years as administrative engineer for the State of Michigan before coming to Denver in 1957.

As well as being a past national director of the Society, he was also a former chairman of the Ethical Practices Committee and served on other committees. He was a member of the Professional Engineers of Colorado and the Michigan Society of Professional Engineers.

Governor McNichols of Colorado said that Mr. Hall "was one of the most able planners we have ever had in state government."

Other recent deaths:

William F. Farnham, of Camp Hill, Pennsylvania, member of the Pennsylvania Society of Professional Engineers.

A. Prescott Folwell, of Vienna, Virginia, former editor of *Public Works* magazine.

E.E. George, of Little Rock, Arkansas, member of the Arkansas Society of Professional Engineers.

Orrin W. Jones, of Corpus Christi, Texas, member of the Texas Society of Professional Engineers.

Van Praag Honored With Life Membership in ASCE

Alex Van Praag, Jr., president of the engineering firm of Warren & Van Praag, Inc., consulting engineers, was recently honored with a life membership in the American Society of Civil Engineers.

Mr. Van Praag is a past president of both NSPE and the Illinois SPE.

By Mrs. Garvin H. Dyer, Chairman of the Ladies Auxiliary Advisory Committee.

The wives of the Abilene, Tex., Chapter organized an auxiliary recently with thirty charter members. Mrs. James Dawley was elected as the first president.

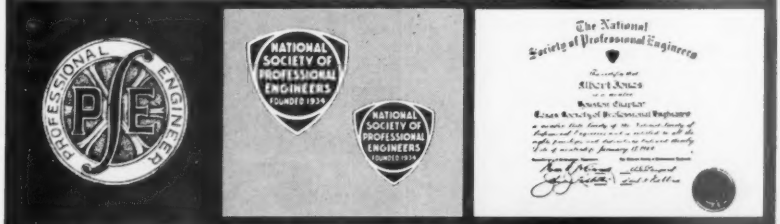
The Northwest Chapter Auxiliary of Oklahoma held their annual money-making project in February. They prepared and served a covered dish dinner for the men and their ladies, and found it a very successful way to raise money.

The Mid-North Chapter Auxiliary of Oklahoma have an interesting project, which has been to "mother" the Engineerettes Club, a group of wives of engineering students at Oklahoma State University. They are an enthusiastic group of young women who want to learn how to best help their engineer husbands. Four Auxiliary members serve as an advisory board each year. The Auxiliary has helped them financially a few times. Each year the Auxiliary entertains the Engineerettes at a social of some kind. This year it was in the form of a St. Patrick's Day tea held in the home of a member. This was well-attended and much appreciated by the girls. This sort of contact makes them conscious of the importance of registration for their husbands and it is hoped will result in some future members for NSPE.

The Akron, Ohio, Auxiliary will hold their annual money-making card party and style show in May. This annual affair provides money

(Please turn the page)

Certificates and Emblems are available


PROFESSIONAL ENGINEER
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS
FOUNDED 1934
NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS
The National Society of Professional Engineers

The Professional Engineer emblem is available, styled as cuff links. Can also be ordered in large 3" size as a metal automobile emblem.

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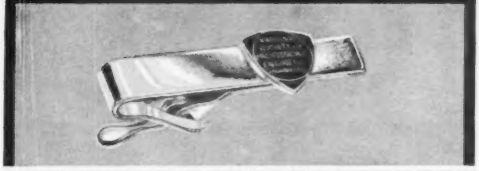

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State

(and if Certificate No. 1 is desired) _____
Chapter

Charms and pins (exclusive of lapel buttons) engraved upon request

AUXILIARIES

(Continued from page 49)

for a scholarship to be given to an engineering student at the University of Akron.

The Champaign County Auxiliary of Illinois have four meetings a year; their programs are very interesting. This year a project was supplying petty cash to a teacher, who is one of their members, to be used for handicapped children.

All news for the "With the Auxiliaries" column should be sent directly to Mrs. Garvin H. Dyer, 10011 East 36th St., Independence, Mo.

All other state society and chapter news should be sent to the AMERICAN ENGINEER *immediately after the events take place.* And if photographs are taken, be sure and send them along too!

The Nueces Chapter Auxiliary of Texas held a successful style show luncheon recently at the Corpus Christi Country Club, which was well-attended by members and guests of this active auxiliary.

The Southeast Chapter Auxiliary of New Mexico was a recent hostess to the ladies attending the New Mexico State meeting. Their advance publicity was extremely clever.

The Galveston, Tex., Auxiliary report an interesting social meeting at which the members saw a new film on industrial Russia.

The Harrisburg, Pa., Auxiliary held a card party and fashion show in February at the West Shore Country Club. Proceeds will be used to support the local science fair and for an engineering award.

A meeting of the board of directors of the State Council of Auxiliaries of Pennsylvania was held in Harrisburg in January. Nine auxiliaries sent representatives. There were twenty-two women present. Mrs. Hugh Nelson, president, conducted the business meeting and was chosen to represent the Pennsylvania auxiliaries at the NSPE annual meeting in Boston.

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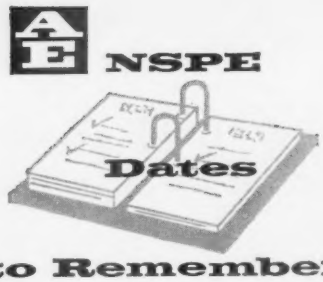


to Remember

Illinois Society of Professional Engineers — Annual Meeting, May 5-7, 1960, St. Nicholas Hotel, Springfield, Illinois.

Oklahoma Society of Professional Engineers—Annual Meeting, May 6-7, 1960, Biltmore Hotel, Oklahoma City, Oklahoma.

Montana Engineering Society — Annual Meeting, May 6-7, 1960, Helena, Montana.

Nebraska Society of Professional Engineers—Annual Meeting, May 7, 1960, Sheraton-Fontenelle, Omaha, Nebraska.

South Dakota Society of Professional Engineers—Annual Meeting, May 7, 1960, Rapid City, South Dakota.

Maryland Society of Professional Engineers — Annual Meeting, May 14, 1960, Baltimore, Maryland.

Rhode Island Society of Professional Engineers—Annual Meeting, May 14, 1960, Providence, Rhode Island.

New York State Society of Professional Engineers—Annual Meeting, May 19-21, 1960, Hotel Statler Hilton, New York, New York.

Pennsylvania Society of Professional Engineers—Annual Meeting, May 19-21, 1960, Pocono Manor, Pocono Manor, Pennsylvania.

Michigan Society of Professional Engineers — Annual Meeting, May 20-21, 1960, Henrose Hotel, Detroit, Michigan.

District of Columbia Society of Professional Engineers — Annual Meeting, May 25, 1960, Cosmos Club, Washington, D.C.

California Society of Professional Engineers — Annual Meeting, May 27-28, 1960, Lafayette Hotel, Long Beach, California.

National Society of Professional Engineers—Annual Meeting, June 8-11, 1960, Statler Hotel, Boston, Massachusetts.

Massachusetts Society of Professional Engineers—Annual Meeting, June 8-11, 1960, Statler Hotel, Boston, Massachusetts.

Georgia Society of Professional Engineers—Annual Meeting, June 16-18, 1960, Radium Springs Hotel, Albany, Georgia.

Professional Engineers of North Carolina—Annual Meeting, June 16-18, 1960, Grove Park Inn, Asheville, North Carolina.

Delaware Society of Professional Engineers—Annual Meeting, June 16-18, 1960, Wilmington, Delaware.

South Carolina Society of Professional Engineers—Annual Meeting, June 17-18, 1960, Cleveland Hotel, Spartanburg, South Carolina.

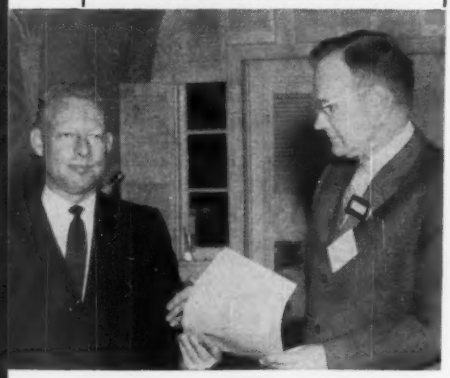
Missouri Society of Professional Engineers—Annual Meeting, June 24-25, 1960, Daniel Boone Hotel, Columbia, Missouri.

Indiana Society of Professional Engineers—Annual Meeting, June 24-25, 1960, French Lick Sheraton, French Lick, Indiana.

Arizona Society of Professional Engineers—Annual Meeting, June 25, 1960, Tucson, Arizona.

National Society of Professional Engineers — Fall Meeting, October 19-21, 1960, Hotel Roanoke, Roanoke, Virginia.

Colorado Officers



E. Vernon Konkle (left) assumes the presidency of the Professional Engineers of Colorado from Immediate Past President Wilbur H. Parks. Mr. Konkle took over at the annual meeting of the PEC at which National Director Thomas T. Mann was the main speaker.

Joe Kirby Receives North Dakota Award

The North Dakota SPE has presented the Chandler Award to Joe Kirby in recognition of his engineering achievements. The annual award was presented during the recent State meeting of the group.

Mr. Kirby is a former president and secretary of the North Dakota SPE. He also has served as a member of the State Board of Registration for the past five years.

'Engineer of the Year'

The Suffolk County Chapter of the New York State SPE recently presented its "Engineer-of-the-Year" Award to Charles P. McFadden. Shown are, l.-r.: Fred J. Biele, senior chapter past president; Mr. McFadden, and Donald W. Chilton, present president.

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MEETING

(Continued from page 46)

Pops, Symphony Hall, Arthur Fiedler conducting

THURSDAY, JUNE 9, 1960

8:00 a.m. Regional Breakfasts
8:30 a.m. Registration
9:00 a.m. Professional Meeting (continues)
Welcoming Remarks by Walter J. Kreske, P.E., President, Massachusetts Society of Professional Engineers
Greetings to Boston by The Honorable John A. Collins, Mayor of the City of Boston
9:30 a.m. Exhibits Open
12:30 p.m. General Luncheon
Speaker: Gordon S. Brown, P.E., Dean of Engineering, Massachusetts Institute of Technology
"Engineering Curriculums — the New Look"
2:30 p.m. Professional Meeting (continues)
7:30 p.m. Dinner
Greetings from the Commonwealth
Introduction of Main Speaekr by Massachusetts Senator Leverett R. Saltonstall
Address: Admiral Arleigh Burke, Chief of Naval Operations, United States Navy

FRIDAY, JUNE 10, 1960

8:00 a.m. Consulting Engineers in Private Practice Breakfast
8:30 a.m. Registration
9:30 a.m. Exhibits Open
10:00 a.m. Annual Meeting of Ladies' Auxiliary
10:00 a.m. Annual Meeting of PECBI
12:30 p.m. General Luncheon
Address: The Role of Engineering in Space Exploration
Dr. Hugh L. Dryden
Deputy Administrator
National Aeronautics and Space Administration
2:30 p.m. Annual Meeting of the Massachusetts Society of Professional Engineers
3:30 p.m. Special Panel Discussion
Political Practices vs. Professional Engineers' Registration
Moderator: L. Weed, President, Engineering Societies of New England
Panelists: Dr. Nathan Stone, Board of Registration
Senator Philip A. Graham, Massachusetts Legislature
Walter J. Kreske, P.E., President, Massachusetts Society of Professional Engineers
4:40 p.m. Bus to Nahant for Clambake at Thompson Club

SATURDAY, JUNE 11, 1960

8:30 a.m. Registration
9:00 a.m. Professional Meeting (continues)
9:30 a.m. Exhibits Open—Special Drawing at Exhibit Area for 4-day Bermuda Prize Trip
10:00 a.m. Special Panel Discussions
Urban Renewal—The Role of Engineering Planning
Moderator: Dr. Cyril C. Herrman, Vice President, Arthur D. Little Company
Panelists: Dr. Robert C. Wood, Associate Professor of Political Science Massachusetts Institute of Technology Author of the book: SUBURBIA
Martin Wohl, Transportation Engineering Department, Massachusetts Institute of Technology
Key to Economic Betterment of the Engineer
Panelists: Dr. William Torpey, Office of Civil Defense Mobilization; Richard G.

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Hoft, P.E., NSPE Engineers-in-Industry Subcommittee; Clark Ransom, P.E., Professional Personnel Relations, Aircraft Accessories Turbine Division, General Electric Company.

12:30 p.m. Exhibits Close

1:00 p.m. General Luncheon

Presentation of First Industrial Professional Development Award to Phillips Petroleum Company, Bartlesville, Oklahoma. Paul Endacott, President of Phillips, will accept

2:30 p.m. Professional Meeting (continues)

4:30 p.m. Meeting of Delegates

6:00 p.m. Cocktail Party

7:00 p.m. Banquet

Installation of NSPE Officers for 1960-1961

Presentation of NSPE Award

Response: James F. Fairman, P.E. Senior Vice President
Consolidated Edison Co. of New York, Inc.

Address: The Engineers' Role in Politics, Senator Kenneth B. Keating, State of New York

LADIES PROGRAM

Wednesday, June 8
Afternoon ..... Afternoon Tea and Get-together
Evening ..... Social Hour and Buffet Supper with Men*

Thursday, June 9
Morning ..... Guided Shopping Tours
Luncheon ..... With Men
Afternoon ..... Sightseeing trip to Lexington, with tea at the Colonial Inn
Evening ..... Banquet, with Men

Friday, June 10
Morning ..... Annual Meeting of Ladies Auxiliary
Luncheon ..... With Men
Afternoon ..... Free
Evening ..... New England-style Clambake at Thompson Club with Men

Saturday, June 11
Morning ..... Freedom Trail (Sightseeing)
Luncheon ..... With Men
Afternoon ..... Free
Evening ..... Cocktail Party, Banquet, followed by Dancing

* Following the Buffet Supper, the ladies are free to attend Symphony Hall for a concert by the famous Boston Pops. A limited supply of tickets will be available.

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SOUTHWEST

(Continued from page 24)

come with the Space Age. The big industries of the city are closely tied to aircraft, electronics and missiles activity. As a result, a very high percentage of Phoenix's new population is professional.

Motorola, which has its operations at nearby Scottsdale, is a typical example of the type of industry Phoenix has drawn in the post-war years. Motorola started its Phoenix activity in 1949, added another plant in 1956, and topped things off with a big new $3 million one in 1957. Employing more than 3,300 workers, Motorola now turns out more transistors in Phoenix than any other U. S. company. It also operates the Western Military Electronics Research Center.

The result of these and other new industries has put Arizona in front as one of the leaders in the growth of manufacturing employment. During the period of 1948-1949, the number of manufacturing employees in Phoenix rose from 7,000 to 33,000. State-wide the figure shot from 15,900 to 45,700 with an annual payroll of about $213 million.

Why have industries moved into Arizona, once primarily an agricultural and tourist center?

The Phoenix Chamber of Commerce claims that the State's dry sun-bright climate is the chief answer. A big labor pool, increased steadily by westward shift in the country's population, apparently also contributes to the attractiveness of the State. Land for plant sites is also plentiful and state taxes have been geared to attract new industry.

Tulsa is another Southwestern city which is getting an unusually high percentage of research activity. The city now lays claim to having the highest percentage of engineers and scientists per 1,000 population in the U. S.

Much of Tulsa's research complex is built on the oil industry, still the biggest employer in the area. More than 859 oil companies have offices in Tulsa and many operate laboratories and research centers.

Not all of Tulsa's research activ-

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ity is limited to oil. Engineers and scientists also are using the city as a base of operations for studies in chemistry, metals, food packaging and processing and instrumentation.

All of this research activity has made Tulsa the home for major technological breakthroughs, particularly in the oil industry. Pan American Petroleum Corporation, one of the big research outfits in Tulsa, ten years ago developed the "Hydra-frac Process," one of the most widely acclaimed and universally practiced methods of oil recovery in use today. The process is believed to have increased by five billion barrels the amount of recoverable oil reserves in the U. S. and Canada.

Tulsa also has budding manufacturing operations outside of the oil industry including the Douglas Aircraft Company which employs 7,500 persons in its jet bomber and cargo plane production.

Tulsa, Phoenix, Fort Worth, Dallas, and Houston are just a few of the bigger stops on the Southwest growing industrial map. In between there are dozens of other examples of the changing face of this active area. The Southwest is already a major industrial area; tomorrow, it undoubtedly will loom even larger for both the industrialist and his very necessary partner, the engineer.—End.

Oustanding Engineer in Chicago

John Dolio, a consulting engineer, was recently selected by the Chicago Chapter of the Illinois Society as the "Outstanding Engineer of the Year" in the Chicago area. Mr. Dolio was presented with a citation by Mayor Daley in a ceremony at City Hall. Shown, l.-r., are: Albert G. Freiman, member, Public Relations Committee of Chicago Chapter; Mr. Dolio; Mayor Richard J. Daley; George Chlebicki, president of Chicago Chapter of ISPE; Ralph Abramson, chairman of the PR Committee, and John G. Duba, administrative officer and "deputy mayor" of Chicago and past president of the Chicago Chapter.

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ETHICS

(Continued from page 39)

action. This is true as to legal considerations, but being a contract for professional services other professional engineers must consider its ethical aspects when terminated without just cause by the Owner.

If the Owner terminated the contract from unjust causes such as whim, caprice, unsound motivation, dishonest purposes, etc., then Engineer "B" in accepting employment clearly violated Section 23 of the Canons of Ethics.

Conclusion:

From the facts as submitted Engineer "B" could have acted either ethically or unethically depending upon the *assumptions* made in the conclusions.

The facts should preclude the necessity of any assumption in the Board's conclusion.

The case should be returned to the staff for amplification of the facts and then resubmitted to the Board.

MARVIN C. NICHOLS, P. E.
WYLIE W. GILLESPIE, P. E.

NSPE State Presidents' Conference

Purdue University was again the site last month for NSPE's State Presidents' Conference as the heads of the various affiliated state societies gathered for a two-day session. The photo at the left shows the presidents at the opening get-together, while at the right, National Society President Harold A. Mosher talks to the group at a banquet. Prof. George H. Mayer of Purdue was a guest speaker.

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Progress in Products

COLOR-COATED STEEL — Item 30

Color-coated steel, one of the fastest growing new building materials, is now being offered by Stran-Steel Corporation in nine new colors, selected especially to meet the demand of modern design trends. The new line of colors will be available on 26, 24 and 22 gauge panels, 36 inches covering width, and in any lengths desired. They are designed for use on walls and roofs, or as an accent material with brick, wood, stone or glass.

POSITIVE COPIES — Item 31

Projection Mono-Copy, a silver sensitized reproduction paper for making enlarged positive copies directly from negative microfilm, has been developed by Anken Film Company. This process has been designed to eliminate the time-consuming, three-tray manual developing operation when making enlargements of microfilmed drawings, maps, reports and office records. With Projection Mono-Copy, the operator exposes in the normal manner on any standard microfilm reader-printer or microfilm projection equipment. One-step developing is done in Anken's Monobath solution, using a machine processor of the Anken "27" type. No further fixing or washing is necessary. Operations can be carried on under subdued light conditions.

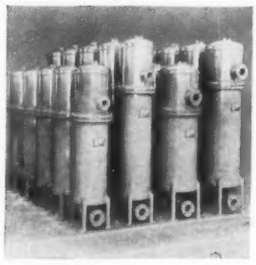
LEAD-HOLDER — Item 32

Another precision writing instrument has been added to its range of Microtomic drafting and drawing pencils, it has been announced by the Eberhard Faber Pen and Pencil Company. This latest is the Microtomic Lead - Holder (#614), which is a more advanced design of the earlier Microtomic #607. The new holder is light in weight and perfectly balanced, with bronze clutch and strong spring to keep the lead from twisting, slipping or spiralling, it is claimed.

REFERENCE CHART — Item 33

A unique quick reference chart for printed circuit draftsmen has just been issued by the By-Buk Company. It is a copyrighted 6-page table which includes all of the pre-cut shapes and sizes of pressure sensitive drafting aids required to make paste-up printed circuit drawings that will conform to military specifications, together with many new nonmilitary configurations. Illustrations are provided in a convenient chart form for easy cross reference between corresponding donut pad, teardrop pad, and twin pad sizes. The purposes of the several kinds of tape used for making printed circuit drafting aids; black photographic, white, black on white and translucent red, are fully described.

LIQUID FILTER — Item 34



A small-size filter unit by R. P. Adams Co., Inc., is claimed to answer the need for a low-cost filter package for pilot plant or development applications, yet is designed for any process where small flows are involved. Some typical applications for the new LFH Filters are process water, industrial water, brine solutions, demineralized water, and a wide variety of process fluids.

THEODOLITES — Item 35

A new line of theodolites designed for American and Canadian engineering practice has been introduced by Keuffel & Esser Company. The three new models—designated the KE-2, KE-1 and KE-6—are the result of extensive research including a two-year survey to determine design features preferred by North American engineers. An outstanding feature of these theodolites, according to K&E technical experts, is their practicability, from the heat-reflecting light color to the coaxial arrangement of clamps and tangent screws located on one standard of the instrument.

NYLON CASTINGS — Item 36

Nylon Molded Products Corp. is introducing "Nylocast," a licensed European process for casting nylon parts. With this exclusive method, heavy nylon castings are made practical through fractional tooling costs, lower running rates and short run requirements, according to the manufacturer. This process makes use of higher viscosity nylon than can otherwise be used. Yet there is practically no limitation on cast-in inserts, threads, lugs, intricate shapes or varying thicknesses.

TRACING PENCIL — Item 37

A pencil, created specifically for making tracings on polyester-based film, has been developed by the Joseph Dixon Crucible Company. It is called the FTR (for film tracing reproduction). The lead is compounded of "totally new resins," super-fine graphites and some plasticizers which block out light to leave on copy prints drawings of black ink clarity, it is claimed. Dixon has designed the pencil to look like a precision instrument. It has a dark gray metallic finish of silver foil, and is produced in six degrees of lead hardness, coded from FTR 11 to 66. It is silver capped at one end.

This feature describes new products of general interest to professional engineers. For further information, circle the item number in the Readers' Service Dept. and mail to AMERICAN ENGINEER.

These listings are informational and are not an endorsement of the products, nor of the manufacturer's claims.

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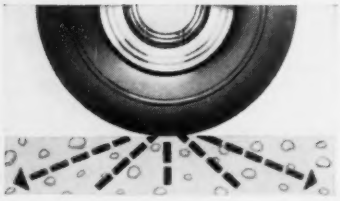
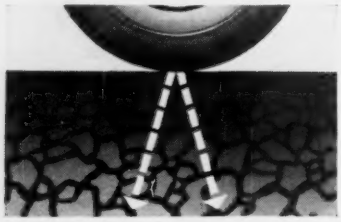


Concrete's beam effect distributes wheel weight over large area of subgrade, reduces spot pressures. Strength of material—not mass—carries the load, permitting minimum-thickness pavement.



Flexible pavement, by its very flexing effect, transmits load forces in almost direct line to subgrade. Excessive concentration of load force can be overcome only by building up pavement thickness.

Interstate System highways like Kentucky's Route 65 pictured here call for a pavement that is solid and unyielding.

Kentucky's highway department chose concrete for this important stretch of Interstate System highway. Necessity for multiple strata construction of 2 to 3 times greater total depth was avoided.

Strength with minimum bulk is possible, of course, because concrete isn't flexible. It supports and spreads the load like a beam. Pressures on the subgrade stay permanently within safe limits.

And concrete's design efficiency assures low maintenance costs in years ahead. In fact, maintenance costs will be as much as 60% lower than for asphalt. Only concrete enables engineers to design highways to last 50 years and more.

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